

RAILROAD GAZETTE

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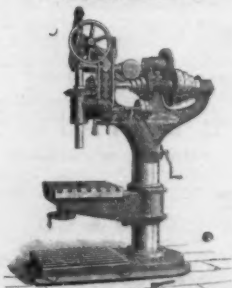
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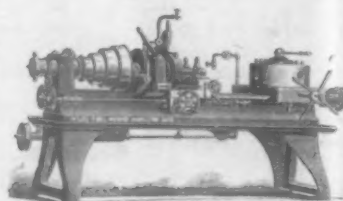
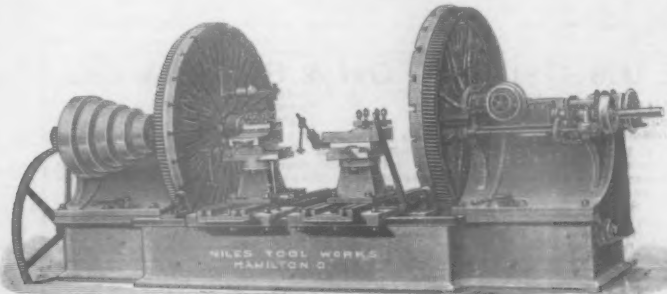
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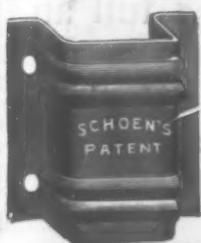
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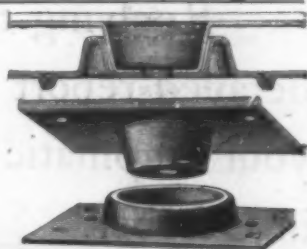


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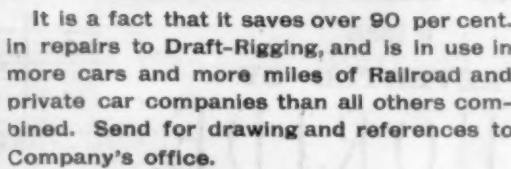
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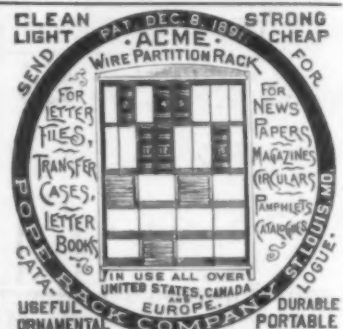
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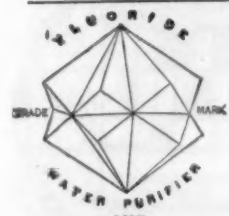
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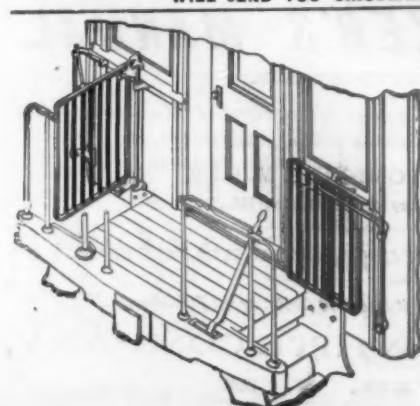
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 Edward Norton & Co., 55 B'way, N. Y.
 Worden & Fanshawe, 9 Wall St., N. Y.
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 Chicago & Alton.
 Chicago, Burlington & Quincy.
 Chicago, Milwaukee & St. Paul.
 Chicago & Northwestern.
 Chicago, Rock Isl. & Pacific.
 C. H. & D.
 Hoosier Tunnel Route.
 Illinois Central.
 Kansas City, Scott & Memphis Ry.
 Lehigh Valley R. R.
 Michigan Central.
 Missouri, Kansas & Texas Ry.
 Missouri Pacific.
 New York Central & Hudson River.
 New York, Lake Erie & Western.
 New York & New England R. R.
 Pennsylvania.
 Philadelphia & Reading R. R.
 St. Louis & North.
 Texas & Pacific.
Railroad Printing
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Railroads, Building & Equipping
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Railroad Supplies
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 Reginald Canning & Co., 115 B'way, N. Y.
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 Fairbanks, Morse & Co., Chicago.
 Central Oil & Supply Co., 24 Whitehall St., N. Y.
 The Johnson R. R. Signal Co., Rahway, N. J.
 A. S. Males & Co., Cincinnati, O.
 N. Y. Equipment Co., 15 Wall St., N. Y.
 G. D. Peters & Co., London, England.
 T. T. Shoenberger, Chicago and N. Y.
Rail Saws
 Bryant & Barby, 175 Summer St., Boston.
 G. Ehrhardt & Sons, Pittsburg, Pa.
Railway Varnishes & Surfaces
 Flood & Conklin, Newark, N. J.
 Murphy & Co., Newark, N. J.
Ratchet Drills
 Billings & Spencer Co., Hartford, Conn.
 Schuttler Mfg. Co., Chicago.
Reducing Valves
 Curtis Regul. Co., 59 Beverly St., Boston.
 Mason Regulator Co., Boston, Mass.
Refrigerator Cars
 E. H. Hancock, Camden, N. J.
Refrigerating Machinery
 De La Vergne Refrig. Machine Co., N. Y.
Rivets, Slotted
 J. A. Thomson Mfg. Co., Waltham, Mass.
Road Scrapers
 Amer. Steel Scraper Co., Sidney, O.
Rock Blasting and Rock Breakers
 Thos. Carlin's Sons, Allegheny, Pa.
 Gates Iron Works, Chicago, Ill.
Rock Drills
 Billings & Spencer Co., Hartford, Conn.
 Rand Drill Co., 23 Park Place, New York.
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 Jas. G. Wilson, 74 W. 23d St., New York.

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 East. Gran. Roofing Co., Jersey City, N. J.
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 Berlin Iron Bridge Co., E. Berlin, Conn.
Rolling Journal Bearings
 Menzies Bearing Co., W. Troy, N. Y.
Rolling Stock to Lease
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 Ashton Valve Co., Boston, Mass.
Saw Mills
 Richmond (Va.) Loco. & Mach. Wks.
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 Bensinger Polytechnic Inst., Troy, N. Y.
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Second Hand Steel Rails
 W. H. Perry & Co., Providence, R. I.
Sewerage
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Sever Pipe
 Wuerpel & Post Pipe Co., St. Louis, Mo.
 R. D. Wood & Co., Philadelphia, Pa.
Shafting
 Wm. Sellers & Co., Phila.
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 Rail Signal Co., 50 Broadway, N. Y.
 Johnson R. R. Signal Co., Rahway, N. J.
 Kinman Rk. System Co., 145 Liberty St.
 Morley Safety Signal Co., Galton, O.
 Nat. Switch & Signal Co., So. Bethlehem, Pa.
 Union Switch & Signal Co., Pittsburg, Pa.
 Wuerpel Switch & Signal Co., St. Louis, Mo.
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 Valle & Young, 309 No. St., Baltimore, Md.
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 Bull Mfg. Co., Brooklyn.
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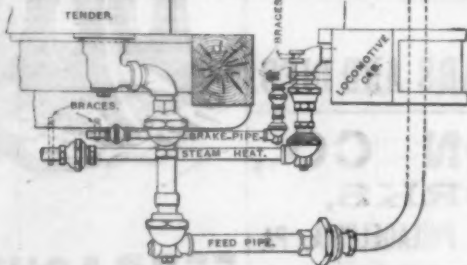
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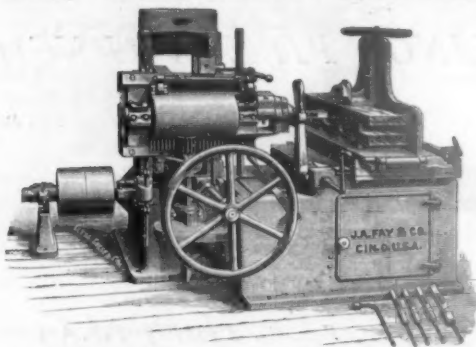
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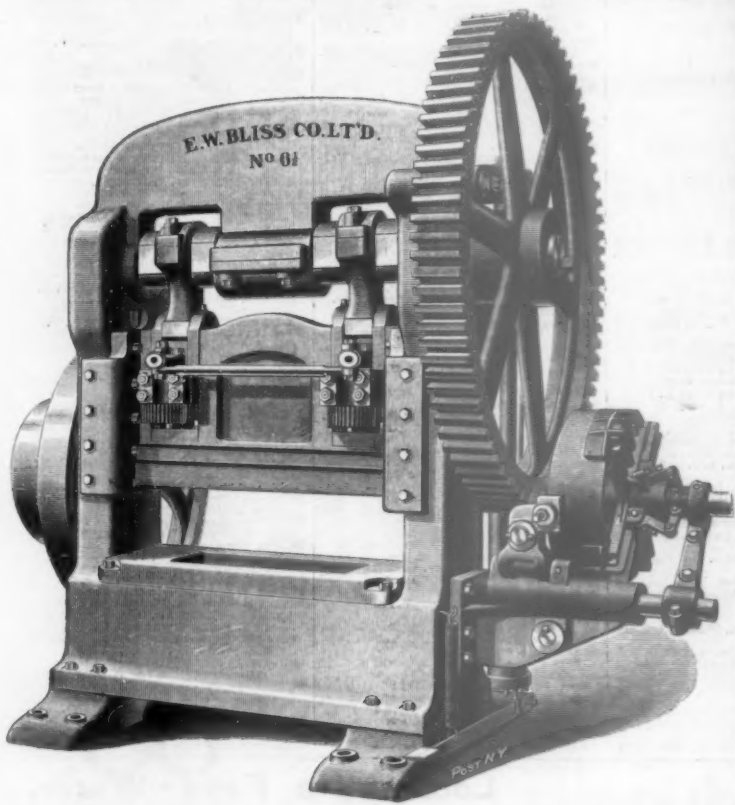
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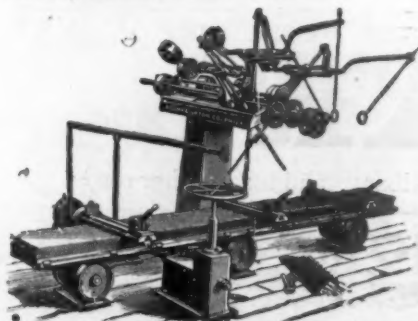
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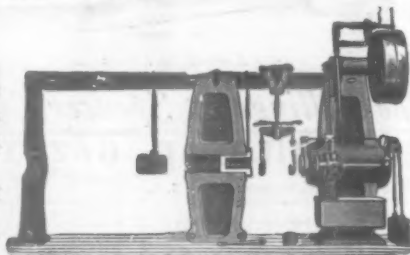
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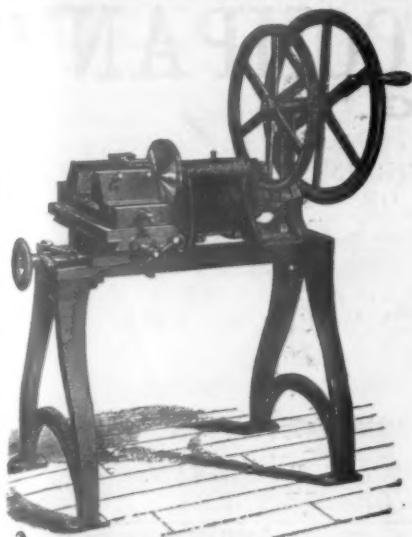
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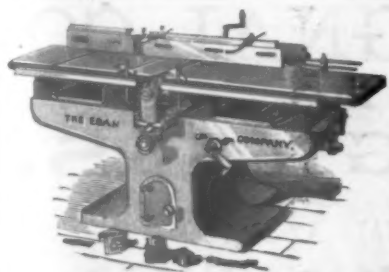
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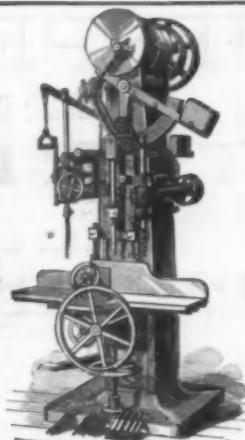
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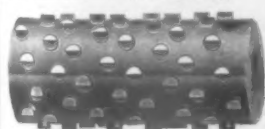
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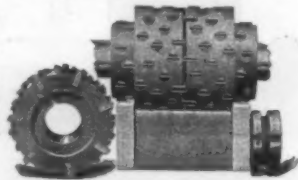
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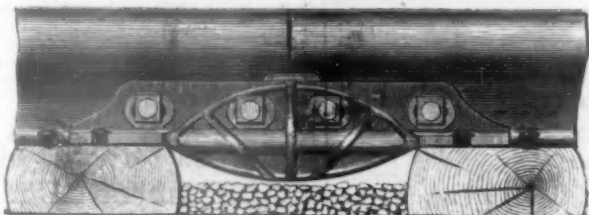
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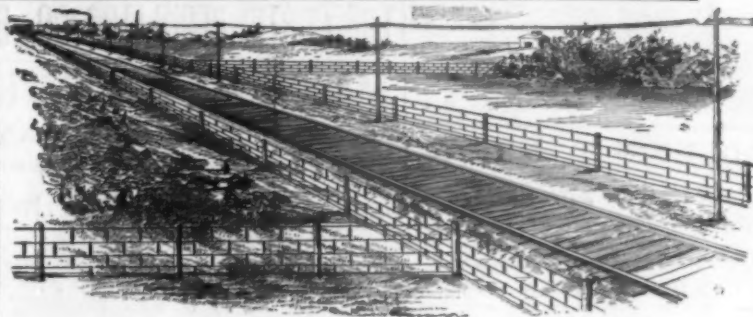


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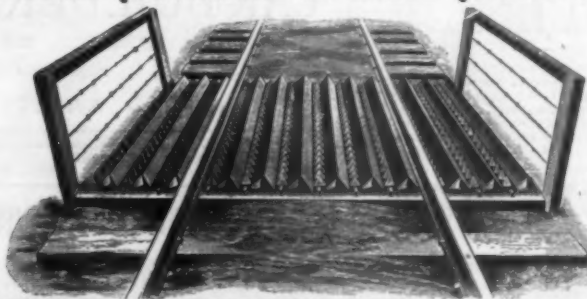
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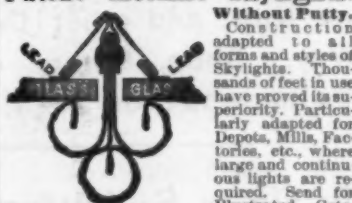
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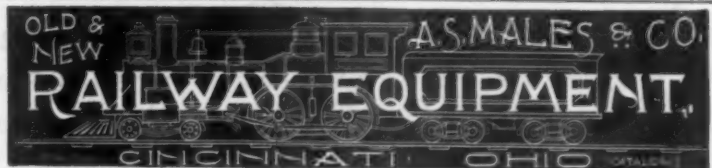
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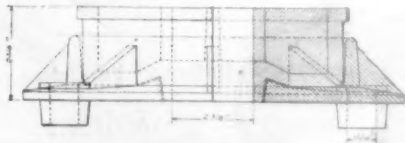
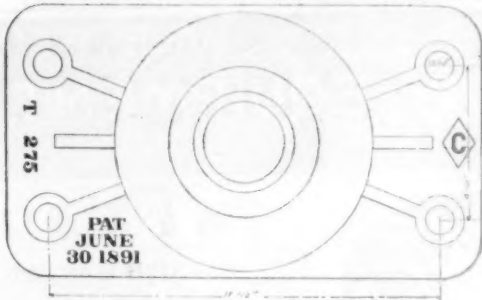
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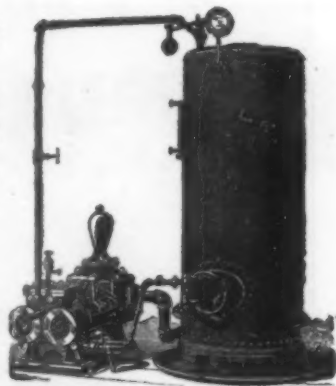
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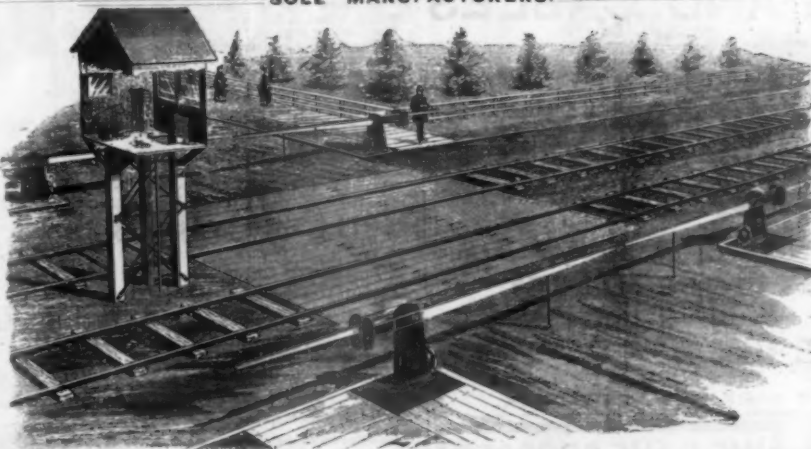
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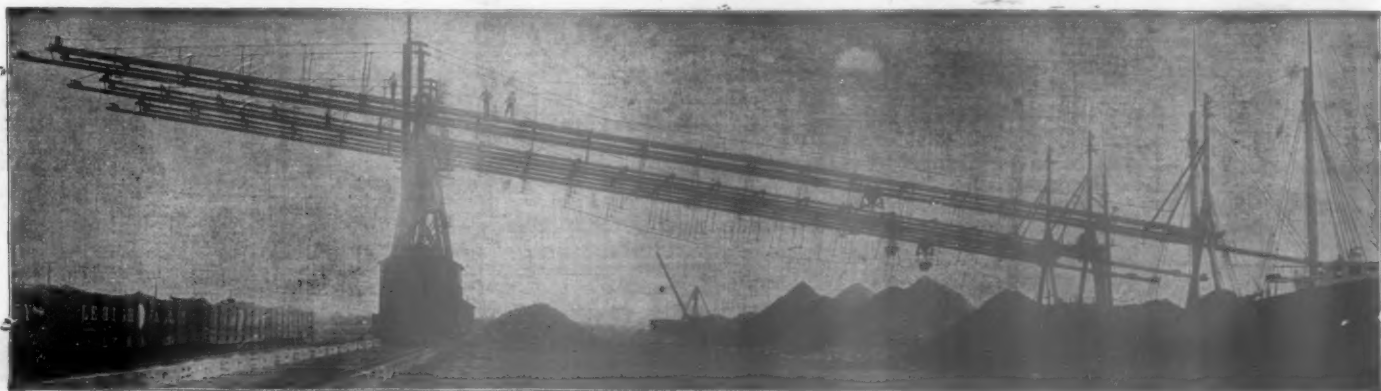
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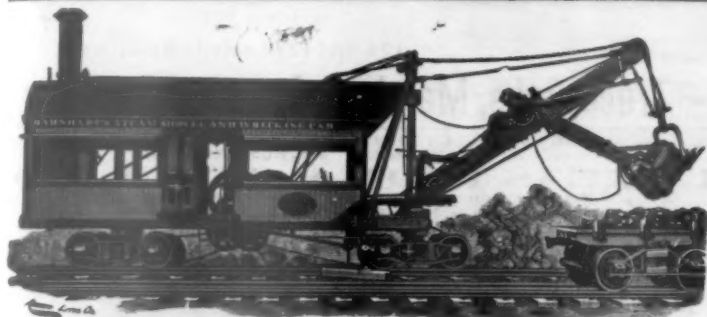
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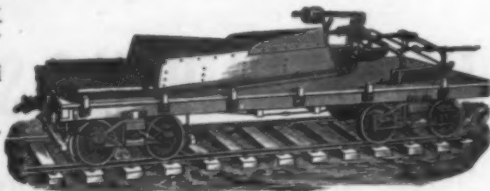
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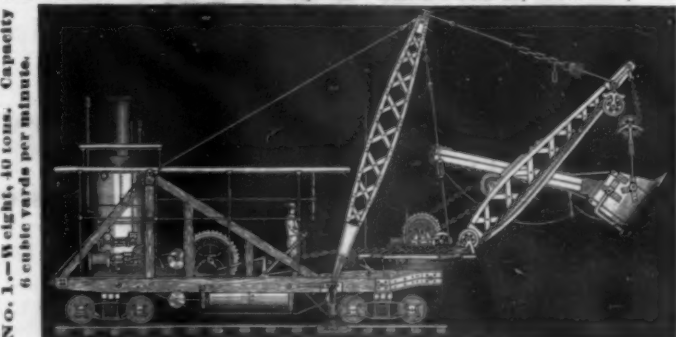
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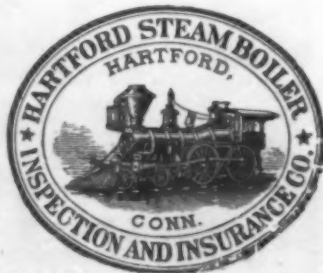
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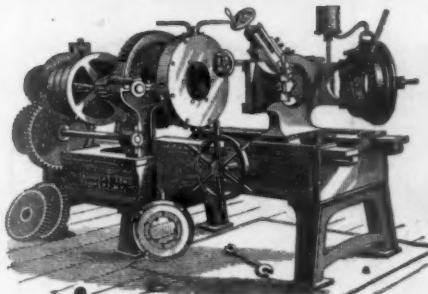
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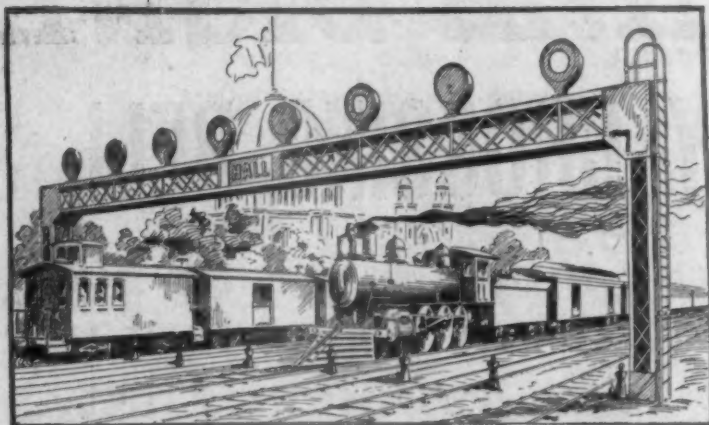
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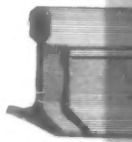
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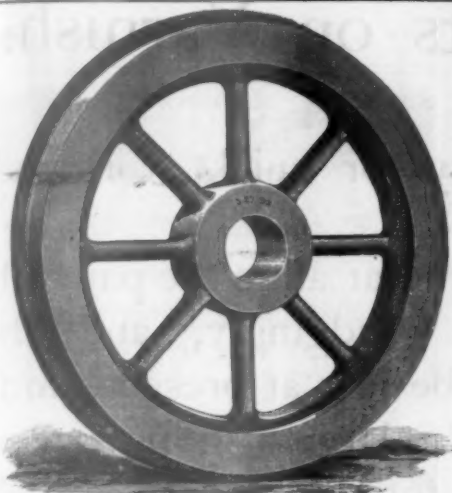
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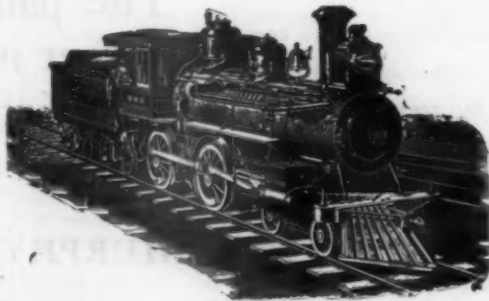
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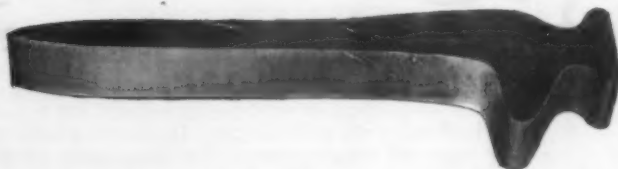
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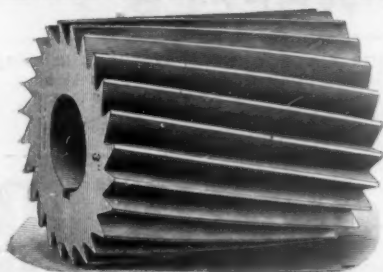
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Mileage on Private Cars.

CHICAGO, Oct. 12, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The movement to stop the outrageously high mileage that the railroads are paying for the refrigerator and stock car owned by outside parties deserves more than a passing notice, for it shows some signs of becoming strong enough to really affect the powerful interests working against the railroads in this matter. Not much of consequence has been done yet, but any movement that once gets started will be joined by a good many, for the feeling is strong.

The action of the Chicago & Grand Trunk in reducing mileage on cars carrying dressed beef with salt and ice for cooling was made, as Mr. Reeve states, because the dripping of the melted salt and ice on bridges, etc., necessitates so much expenditure in the way of cleaning and painting, that with the present volume of the dressed beef business over that line the company was unwilling to continue paying $\frac{3}{4}$ cent mileage on the cars. When there was a large volume of the business the road did not object to the $\frac{3}{4}$ cent. It is understood that the position taken by the road with the refrigerator car companies had a string attached to it; in fact, that if they gave the road a sufficient volume of the business the mileage rate would not be cut down. The Chicago & Grand Trunk has made no change in the mileage paid on refrigerator cars carrying other freight. It is to be regretted that Mr. Reeve had not the nerve to make a flat proposition of say half a cent. He would then have been in a better position with both the refrigerator car companies and the other roads. But he is, of course, all the time beset by his superiors to get more of this traffic, and he is evidently afraid to go to the extent of completely antagonizing the private car companies until he is satisfied that enough other lines will join in the movement to relieve his company of the odium attached to such a move by the private car people.

The action of the Chicago Great Western is probably more likely to amount to something than is the Chicago & Grand Trunk's. It is pretty certain that several of the large lines west of Chicago will refuse to renew their contracts with the Street people, and many of the lines now paying mileage on these cars are endeavoring to throw them out. The St. Paul has already discontinued paying mileage; the Rock Island has not used the Street cars for over a year; other important roads will get out of it as soon as they can; while still another, which has been probably the strongest supporter of the Street cars, has decided not to renew its contract.

This matter of mileage on private cars has been up before different associations and the general managers a number of times within the past six months, and apparently all that is now needed is a little more backbone on the part of some of them to discontinue the practice altogether.

H. M. F.

Some Disputed Points in Railroad Bridge Designing.

(Continued from page 773.)

EDWIN TRACHER, M. Am. Soc. C. E.: Fully agrees with the author in the matter of abolishing concentrations, but he would take equivalent uniform loads from greatest bending moments for spans less than 90-100 ft., and from greatest shears above that limit. He does not concur with Mr. Waddell in regard to typical loads, but suggests those given by the Erie, B. & O., P. C. & St. L.; L. & N. and P. R. R. 180-ton engines with 80,000 lbs. on drivers, 8 ft. centres, the latter two to apply to ties and short spans only. As railroads are indifferent to labor put upon bridge companies, they will probably not change their specified loads; hence it is better to make types from loads now in use. He would allow 150 lbs. per linear foot wind pressure for unloaded chords and 450 lbs. for loaded ones, for spans up to 200 ft. For longer spans he would make greater allowance, and for special cases of double decks, fences, etc., he would use 30 lbs. per square foot of exposed surface. He considers 30,000 lbs. per square inch a proper wind stress for iron lateral rods and observes that 30 lbs. per square foot would buckle the lower chords of most bridges. He strongly criticises Theo. Cooper's specifications for wind pressure against viaducts, and states that they would make posts for a 90-ft. high trestle, recently designed, 100 ft. apart at their bases; or with the usual slope of one in six, they would lift 280 cu. ft. of masonry. He would leave the style of truss to designers, but considers plate girders over 90 ft. in length rather objectionable, as liable to be troublesome in shops and injured in transportation and erection. He prefers floor beams riveted to posts, if the rivets are in double shear, but he does not object to plate hangers. In subdivided Pratt trusses he prefers the sub tie to the sub strut on account of appearance as well as economy. If the width between truss centres is one-twentieth the span, the top chords, whatever be their dimensions, must be designed for not less than 20 diameters. He prefers track stringers 9 ft. apart centres, as heavy timber floors are then required.

and greater convenience in bolting ties, guards and stringers is obtained. He doubts whether steel will ever be more extensively used than now. He considers the mildest steel less reliable than iron, and although it unquestionably is safe under ordinary conditions, it does not nor ever can equal iron under all conditions. He does not agree with Mr. Waddell as to the formula for tension members, and thinks that a formula with the factor $\left(1 + \frac{\min.}{\max.}\right)$ is prop-

er, as it simply makes the dead load working stresses twice those for live loads. He shows how Mr. Cooper's results with separate intensities, requiring separate calculations, may be secured by a formula involving $(1 + \frac{\text{min.}}{\text{max.}})$ and necessitating one calculation for any maximum stress. He would not add to sections of bridge members on account of wind stresses unless those stresses exceed the sum of those due to dead and live loads. He makes a practice, however, in case of trestle legs, of adding section if the wind stresses exceed 50 per cent. of those due to dead and live loads, but thinks the 100 per cent. rule would be better. He deprecates the use of any unreamed compression steel of any grade or under any circumstances, as he contends that it is too liable to unexpected fracture. He regards 70,000-lb. steel for both compression and tension members, after annealing and reaming, just as reliable as lower grades.

C. L. GATES, M. Am. Soc. C. E.: Agrees with Mr. Wadell in his desire to abolish concentrated loads, and thinks that three or four typical engines, or equivalent concentrations, might be found to cover nearly all cases of loading. He is in the habit of slightly varying the prescribed wheel spaces in bridge computations, for simplification and convenience, without appreciably affecting the results. He criticizes Mr. Cooper's compression formulae for steel columns in long lengths as giving smaller unit stresses than for iron, and expresses a strong wish for uniformity in the various compression formulae in use. His practice for stiffeners on webs of plate girders is to place them in reference to the ratio of depth to thickness, and to ignore the usual arbitrary rules. He advocates all pin bearings at the intermediate hip joints in upper chords.

CHARLES F. CHURCHILL, M. Am. Soc. C. E.: Deprecates the great variation in live loads specified for railroad companies for new bridges for which he thinks there is no good reason. Prompted by a strong desire to simplify specifications and computations for his road (Norfolk & Western) he found that a system of not more than four concentrations preceded, or preceded and followed by a uniform train load, would meet all requirements. He therefore made diagrams of equivalent uniform loads for such a system, for the greatest bending, and shears for all spans up to 200 ft. All the new bridging for his road during the past three years has been constructed for four concentrations of 34,000 lbs. each, or two of 43,000 lbs. each, with 4,000 lbs. per linear ft. for train load. He advocates a few typical systems with not more than four concentrations for each, with corresponding diagrams or tables of equivalent uniform loads, rather than the engine loads recommended by the author.

ROBERT MOORE, M. Am. Soc. C. E.: Fully indorses Mr. Waddell's views regarding load concentrations, and has abandoned them in his own practice. When time allows he computes the equivalent uniform loads. Under other circumstances he uses a uniform load with a single concentration at its head, but he has one standard for the floor, another for the web, and a third for the chords. He agrees to use standard equivalent uniform loads if computed by Mr. Waddell and approved by a committee of the Am. Soc. C. E. He also agrees with Mr. Waddell in excluding suspended floor beams, and approves rigidly fastening them to posts. He thinks danger to rivets in such cases is much overestimated, and if the connection is made by a plate through a Z post, nothing better can be desired. His strong preference is to place the stringers just 6½ ft. apart centres, so as to hook-bolt the outer guard rail to the outer flange of the stringer at such a distance from the rail as to prevent derailed trains from striking the trusses. The views expressed by Mr. Waddell in regard to the use of steel meet his approval, and he uses that material in his practice whenever possible except for screw bolts and minor members.

MANSFIELD MERRIMAN, M. Am. Soc. C. E.: Thinks computations with locomotive concentrations unprofitable, but holds that little or nothing is gained by attempting the use of equivalent uniform loads. Small errors of two per cent. are of no importance, but he does not see any essential gain in simplicity. He is inclined to advocate a uniform load with a single concentration at any point, as, on the whole, the simplest for all circumstances and best adapted for the desired result.

A. J. Du Buis, M. Am. Soc. C. E.: Denies the author's claim to the discovery of a new principle in the method of finding floor beam reaction. He denounces the method of computation by load concentrations and heartily unites his efforts with those of the author in the attempt to substitute uniform loads for such concentration.

J. P. SNOW, M. Am. Soc. C. E.: Thinks the practice of using uniform loads is making substantial progress, and he favors it; but he believes the engine diagram has been of great service to the buyer who has not known how to design. At present he uses a uniform load vary

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Contributions

Disputed Points in Bridge Designing.

NEW YORK, Oct. 17, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A few weeks ago the *Railroad Gazette* gave a very ingenious justification for its having substituted a "w" for the last "o" in Mr. Cooper's name. But I do not believe it can find any authority for its publishing my name as "Bueler" in the abstract of Mr. Waddell's paper in its number of 14th inst. Besides, when brevity is required "Buck" is more suitable.

In the article in question I am quoted as saying that I "would make all lower chords" (of bridges) "stiff up to 175 ft. spans." What I did say was that it might be well to consider the advisability of making all lower chords stiff up to 175 ft. spans.

L. L. BUCK.

More Trouble for the Grammarian.

Oct. 14, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have always been of the opinion expressed by Mr. Brophy in the *Railroad Gazette* of 7th inst. that the use of "nor" with "not" is grammatically incorrect. Upon the appearance of his communication I brought it to the notice of a friend with whom I had, some months ago, a little discussion upon this same subject.

Now, however, I am confronted by a bit of evidence on the other side. The order of Solemnization of Matrimony in the English (not the American) Prayer Book says: ". . . and therefore is not by any to be enterprised, nor taken in hand, unadvisedly, lightly or wantonly."

The gentlemen who composed the work in question, while they may not have been posted on all matters connected with railroads, ought certainly to have been first-rate grammarians, and I confess that this blow from such a source gives me pause, and I shall hope that you may be able to shed or borrow further light upon the subject.

NOTOR.

A Derailment and Rail Joints.

NEW YORK, Oct. 18, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A friend of mine has just returned from a business trip in the West. Last Friday (14th inst.) his train on the Santa Fe road was delayed between Pueblo and La Junta by an accident and final smash up of a freight train of 25 or 30 cars. Somewhere about the middle of that train, from some unknown reason, the after wheels of one of the trucks had jumped the track so one wheel on that axle had its flange outside of the rail, and of course the other was several inches inside the other rail and on the ties. This continued for over 12 miles finally ending at a switch with a general collapse of that train. A temporary track was made around this point to permit passage of my friend's train.

Now comes the remarkable part of the story, in that the flange of that wheel stripped nearly every one of the fish-bar bolts off by breaking or crushing the nuts and bolts for the whole of that 12 miles, as also knocking out many of the spikes on that side. I inclose one of these bolt ends which he picked up, for your examination. You will excuse me if I remark that such a stripping off could not have occurred with the "Fisher" joint and consequent chance of frightful loss of life

ing from 30,000 lbs. per linear foot for 4 ft. spans, to 4,340 lbs. for 150 ft. spans. To this he adds $\frac{25,000}{\text{span}}$ to cover impact. For very short spans he also uses two 45,000-lb. weights 8 ft. apart, plus $\frac{30,000}{\text{span}}$. He states that he has used

the method given by Mr. Waddell for floor beam reactions constantly since 1884. Riveted pony trusses up to 60-ft. span are his preference to through plate girders, on account of the latter being liable to injury during transportation and erection. The deck plate girder with cross floor beams and stringers under rails with their tops level with the main girders (for the support of the ends of ties), meets his approval. He considers the double cancellation riveted girder superior to that of the Warren type, although he uses the modified Warren with verticals to mid panels of the chord carrying the moving load. He disagrees with the author in that he would use double track pin spans down to 100 ft., but agrees with him in condemning hangers free on the pins, and in requiring stiff lateral systems for loaded chords. He uses 7 in. \times 8 in. \times 12 ft. ties, dapped $\frac{1}{2}$ in. to $\frac{3}{4}$ in. on stringers, and laid 12 in. apart centres, making 4 in. spaces. He objects to stringers far apart which the author advises, and holds that ties should serve only to keep rails to gauge and line, although he knows of no case where ties have bent down the flange angles of stringers widely separated. He has abandoned the practice of bolting the tie floor to the iron work, as he considers it unnecessary. He does not favor unit stresses derived from fatigue formulae, but his practice is to use less unit stresses for those tension web members subject to greater variations than for the others, by an amount

dependent on the value of $\frac{\text{Min.}}{\text{Max.}}$. He does not agree

with Mr. Waddell in assessing plate girders less than 20 ft. long, but maintains that length of panel must depend on length of span. His practice is to use one-sixth of the web as chord area if the web sheet is without splices, but not otherwise. In designing pins he uses the load conveyed by any member as if it were applied over the thickness of the latter, and not at its centre point.

W. R. HUTTON, M. Am. Soc. C. E.: Agrees with Mr. Waddell that the entire section of a plate girder, including the web, should be considered in computing its resistance to bending, although some French writers attempt to defend the other practice on theoretical grounds.

W. L. COWLES, M. Am. Soc. C. E.: Believes that any method of computation which increases simplicity and reduces labor, with a close approximation to accuracy, is to be approved. He, therefore, favors the substitution of uniform for concentrated loads, but thinks it may be well to increase the equivalent uniform load by a sufficient percentage to cover the small error involved and the future increase of moving load. The author's objections to pony trusses on account of uncertain upper chord strength are, in his judgment, well founded, but he does not concur in his preference for the secondary strut of the Pettit truss, although he admits that it increases the rigidity. He prefers ties running to the top of the centre posts in order to prevent stress reversion in them. He expresses a general concurrence in Mr. Waddell's opinion of end post stresses, and would design for the wind bending. In order to provide against blows from passing trains he advocates collision struts on end posts, which incidentally shorten the length of the latter. He regards the objections against riveting stringers to floor beam webs valid, although counting the lower $\frac{1}{2}$ of rivets only largely removes objections. If stringers rest on top of floor beams he would have separate braces for each.

PAUL WOELFEL, M. Am. Soc. C. E.: Does not think much is gained by using uniform loading if modern graphical methods are employed for the concentrations, although he does not object to the change. He claims that Mr. Waddell's method for finding floor beam reactions has been known and taught for many years. He does not agree with the author in regard to plate girder webs, but, at the same time, admits that it is difficult to prove any failure from too thin webs. The shear exists, but not as vertical shear only, in the web. He cites the great increase of strength in the case of two beams, one placed on the other, riveted together along the horizontal line of junction, as showing that the shear in a horizontal direction is the main shearing stress to be resisted. He agrees with Mr. Waddell both as to the end stiffeners and wind pressures. He does not admit that there is any fatigue in bridge members as ordinarily designed, but thinks that the fatigue formula of Joseph M. Wilson is a convenient method of allowing for impact. He approves a varying scale which allows a wide margin for impact in short spans, decreasing to a small one for long spans. The exact allowances can only be determined by tests, which he describes how he would conduct for members sustaining the various possible stresses and their combinations. He favors a single formula for both pin and fixed end columns on account of the rigid connections which may aid a tendency to buckle. He does not concur with Mr. Cooper in making unit stresses small enough to provide collision resistance, but would use one formula for posts and chords, and then find an increase of sec-

tion for a collision bending moment. Riveted lattice pony girders commend themselves to his favor when properly designed, with double web chords and correspondingly wide posts. He advocates such girders for 80 to 110 ft. spans rather than through riveted trusses with the resulting light sections. He agrees with the author in using high working stresses for combinations of dead, live and wind loads, but not with dead and live loads and centrifugal force, as the latter is a regular moving load.

P. C. RICKETTS, M. Am. Soc. C. E.: Agrees with Mr. Waddell in advocating the displacement of concentrations by uniform loads, not so much because computations with the latter require more time, but because they convey a delusive idea of greater accuracy. He, however, disapproves of an equivalent uniform load because, strictly speaking, such a thing does not exist and would favor an assumed uniform load with uniform excess sufficiently large to cover probable future increase of engines and trains. He believes that riveted lattice bridges should be used up to 140 ft. spans for single track and 120 ft. for double track spans. Admitting the scientific nicety of single systems of bracing, he, nevertheless, would approve multiple systems for riveted bridges, for the reason that experience has shown them to be efficient structures. He thinks that plate girders will soon displace pony trusses. Floor beam hangers do not meet his approval, but he does not object to riveted connections between posts and floor beams, where the connection is so made as to make both sides of posts act together. He would place stringers at such a distance apart that the inside faces of the outer guards would be just outside of their webs. The plan proposed by Mr. Waddell seems to him too expensive. He favors the use of steel with reamed holes and approves the author's working stresses. He thinks it irrational to double the live load working stresses for the dead load, as the live load is certainly not instantly applied, even to the floor.

G. BOUSCAREN, M. Am. Soc. C. E.: Does not object to equivalent uniform moving loads, but claims that with proper tables and diagrams concentrations can be treated with equal facility. On the same ground he takes exception to the author's statements that engine weights do not give floor beam and stringer stresses with facility. He admits that the reduction in number of standard train loads is a great desideratum, but thinks that the author's light standard is too heavy, and his heavy standard too light. He would also vary the length of engine with the weight, and thinks the proposed driving-wheel base is too short. He favors retaining 30 lbs. per square foot wind pressure for the loaded structure, and 50 lbs. for the unloaded, with the actual pressure area computed and used by the method prescribed by the author. In his practice he assumes that the wind pressure is carried to the abutments through the top chords, and computes the end post bending on the assumption that the end post feet are pin ended. He would not only provide for wind stresses in the chords, but also test the loading of the posts by side pressure. He agrees with Mr. Waddell in the substitution of riveted trusses for pin trusses in short spans, but would not condemn pony trusses without reserve, as he regards them satisfactory when properly designed. He would use single system pin spans, although he does not regard the objections to double systems as at all serious. Above 200 ft. he would use the Pettit truss with secondary struts, and a polygonal chord above 250 ft. In no case would he use adjustable members as counters, and would design the main members for stress reversion. He disapproves making clearance more than 14 ft. in through spans, and would reduce distance between centres of trusses to $\frac{1}{2}$ of the longest span; nor the greatest depths of trusses more than three times the distance apart centres. In deck spans, where practicable, he would carry masonry up to the top chords for their support. He objects to riveting floor beams to posts on account of the tension in the upper rivets and the induced bending in the posts, unless a top bolt from post to post is used, and of sufficient strength to resist flange stresses with the ends fixed. He would adopt no ratio between lengths and depths of tension member, but allow for bending in design, or, better yet, properly support the member. He uses 4 in. spaces between ties and requires the stringer webs to project 1 in. into the ties for a lock, then bolts third or fourth ties to the stringer flange. Outside lines of guard stringers with the main stringers under the rails are his preference, but if considerations of economy prevent this arrangement, he places the stringers 6 to 8 ft. apart and proportions ties accordingly, with a minimum depth of 8 inches. He prefers oak with the heart side down to yellow pine. Below the elastic limit he does not recognize fatigue in metal. Some French experience with wrought-iron used in a railway bridge for 35 years showed that it had not deteriorated in any way, although stressed in service to a little more than half its elastic limit. Tests of specimens cut from heads of old steel rails with 60,000 lbs. elastic limit showed the same results, although their service stress was 30,000 lbs. per square inch. The same authority (Mr. Contomin) states that steel locomotive axles (30,000 lbs. elastic limit) on his (Northern) railway, with working stress a little more than half the elastic limit, and subjected to 19 reversions from tension to compression per minute, when in use, never fail, but are finally

rejected on account of wear. He therefore believes that the working stress may be taken at half the elastic limit. His method is to add 100 per cent. to the static load for the dynamic effect in riveted connections between stringers and floor beams, 50 per cent. in primary web members, and then decrease to zero at the end of a 500-ft. span. The percentage for impact is, then, $50 \left(1 - \frac{d}{250}\right)$,

d being the distance from the end of the span. He strongly urges making the elastic limit the basis of working stresses, rather than the ultimate resistance. He would make the working stresses for wind loads 25 per cent. greater than those for dead and live loads, i. e., $\frac{3}{4}$ the elastic limit, and would use the same rule for dead, live and wind, in consequence of the rare occurrence of the highest winds. He concurs with Mr. Waddell in his treatment of end posts of trusses, but thinks he is inconsistent in permitting the high working stresses he names. He would not permit any part of the web of a plate girder to be counted in flange area, and disapproves uniting stringers continuously to the web of floor beams but would make a slip joint on every second floor beam, so that the stretch of the lower chord, under moving loads, will not subject stringer connection rivets to tension. He condemns floor beam hangers with screw ends, but would allow suspension with proper details for transference of wind stress to lower chords. The reaming of steel seems to him indispensable and advisable, even in iron for best results. He regards post latticing, as ordinarily designed, too light.

H. H. FILLEY, M. Am. Soc. C. E.: Would adopt uniform loads for the greater part of ordinary bridge work, but thinks the concentration method should be retained, as it has not been an unmixed evil. He is strongly in favor of the adoption of standards by railway engineers in order both to save labor and improve the finished bridge. He would establish working stresses by starting with the static load and then provide for the different degrees of impact. Recognizing the importance of a good bridge floor, he suggests a 4-in. space between ties secured by cast iron blocks. He would then run a plate along outside of and close to each rail, while a steel angle is used for an inside guard and riveted to other angles in every other tie space. The floor is completed by the usual outside guard with an angle bolted to the upper corner nearest the rail. The horizontal leg of the inside angle guard is turned toward the rail so as to supply a smooth track for a derailed wheel. The outside guards are bolted to the flanges of the stringers with nuts underneath and recesses above for the bolt-heads.

JOHN S. DEANS, M. Am. Soc. C. E.: Believes that plate girders should not be used over 75 ft. long. From that length to 135 ft. he advocates riveted lattice girders and pin trusses above the latter limit; but he would exclude multiple systems of bracing. He does not look with favor on the author's plan of substituting uniform loads for concentrations, holding that little labor will be saved or simplicity gained. In his opinion the uniform specification is the panacea for all the ills of the bridge engineer, and earnestly hopes that desideratum may be secured.

FRED. H. SMITH, M. Am. Soc. C. E.: Concurs in the author's opinion regarding lightness of web members in trusses with approximated parabolic chords, and considers them objectionable unless metal is added for stiffness. He objects to floor beam hangers as ordinarily built, but in his early bridge practice he used "compensating suspension links and longitudinal strut ties between the ends of the floor beams, all so fixed that the lateral vibration was carried directly to the masonry without affecting the floor system." He agrees with Mr. Waddell in the advisability of long panels and single systems of bracing, but does not believe it proper to support an upper chord panel point by a vertical post from the apex of the web strut in the Pettit truss. He thinks the settlement of the apex under load will produce secondary bending in the chord, whether substruts or ties are used, and hence holds that the length of the upper chord column is two such panel lengths. He approves upper chord pin joints held in place by jaw plates, and hopes that uniform loads will prevail. The method of floor beam reaction given by the author has been used in his office for a number of years. In a recent work he specified working tensile stresses for one square inch of net section at 31 per cent. of the elastic limit for riveted members; 37 per cent. for eye-bars, with a decrease of one-tenth of one per cent. for each square inch increase of section for built members or eye-bars taken singly. He specified for compression 32 per cent. of prescribed elastic limit for sections of one square inch or less, with an increase of one-tenth of one per cent. of elastic limit for each square inch increase of section. The stresses thus found were used as the numerators of Gordon's formula with length over radius of gyration squared, divided by 18,000, 24,000 and 30,000 for pin ends, pin and flat or two flat ends respectively.

H. H. QUIMBY, M. Am. Soc. C. E.: Seems to favor the retention of the method by concentrations in consequence of there yet being much negligence regarding important details. He cites instances in his experience where great refinement has been required in loads and unit stresses, while important matters of detail have been ignored. In one special case the adjustability of some members nearly wrecked a span through the zeal of an erector in screwing them up.

(TO BE CONTINUED.)

The Johnson Interlocking Machine.

We described this machine, with illustrations of details, in the *Railroad Gazette* of Jan. 18, 1889, but the elegance of the entire design, and the extent to which it has been introduced during the last year or two, justify the illustration now given of a 40-lever machine recently built, with the following brief description:

This machine was designed in 1884 to avoid certain defects in earlier interlocking machines and to give a simple, strong and easily accessible locking. The designer, Mr. Arthur H. Johnson, has secured the following letters patent in connection with the interlocking parts, viz.: No. 317,137, of March 19, 1885, and No. 392,734, of Aug. 17, 1888. Messrs. H. and A. H. Johnson have also made ap-

This movement also brings the curved slot in the rocker radial to the centre of the main lever, so that the result of reversing the lever is *nil* as regards the locking tappet. As the latch is dropped in the reversed position of the lever, the tappet is raised further and effects the necessary releasing of those levers which should be released when that lever is reversed. The action of one tappet is made to release or lock other tappets, by transverse connections and dogs, carried by a rigid locking plate, which also serves to guide and retain the tappets.

The manufacturers wish to point out that the Johnson machine embodied the first successful combination of Stevens' locking and latch actuation. The good points of the machine were at once recognized by Mr. Charles R. Johnson, to whose skill and energy the present com-

had just started, was run into at the rear by a following freight which approached at high speed and one passenger car and six other cars were badly wrecked. Nine passengers were killed and 32 injured. There was considerable fog at the time. It appears that the freight ran past an automatic danger signal. This accident was reported in the *Railroad Gazette* of Sept. 16. It will be necessary to await the investigation of the Massachusetts railroad commissioners to learn the true cause of this collision.

11th, 3 a. m., on Central of New Jersey, at Springtown, N. J., a freight train ran into the rear of an empty engine which had been stopped by a preceding train, wrecking both engines and a dozen cars; one engineer was killed and the other injured. It is said that the fireman of the empty engine went back to signal the freight, when he heard it, but that his light went out.

13th, on New York & New England, near Boston, Mass., a train of empty passenger cars running west was stopped by the bursting of an air brake hose, and immediately after was run into by a following passenger train, wrecking the rear car, which was empty. There was considerable fog at the time. It is said that the brakeman of the foremost train started back promptly, but had gone but a very short distance before he met the following train.

13th, on Delaware & Hudson, in Scranton, Pa., a passenger train ran over a misplaced switch and into some freight cars standing on the sidetrack. The engine and several freight cars were badly damaged; conductor and fireman injured.

14th, on Chicago & Alton, at Nameoki, Ill., a passenger train ran into a pay car, badly damaging the latter. One passenger and a trainman injured. The pay car had encroached on the time of the passenger train.

14th, on Pennsylvania road near Plainsboro, N. J., a freight train ran into the rear of a preceding freight, wrecking the engine, caboose and 5 freight cars. The wreck took fire and a portion of it was burned up. One report says that the engineer of the hindmost train was injured by jumping; another says that he was asleep.

18th, on Pittsburgh & Western, at Kent, O., an east-bound passenger train was run into at the rear by a following passenger train, badly damaging 2 sleeping cars and injuring two passengers.

18th, on Wheeling & Lake Erie, at Lodi, O., a passenger train ran into the rear of a preceding freight, and the engineer was injured by jumping. There was a dense fog at the time.

18th, on New York Central & Hudson River road at St. Johnsville, N. Y., a freight train ran into the rear of a preceding freight, killing a driver. The wreck took fire and several cars were burned up.

20th, on New York, Pennsylvania & Ohio, at Cortland, O., a work train ran into the rear of a passenger train, injuring engineer, conductor and 4 passengers.

22d, on East Tennessee, Virginia & Georgia, near Calera, Ala., a passenger train ran over a misplaced switch and into some cars on the side track, doing slight damage; the engineer was injured.

23d, on Northern Central, near Hanover Junction, Pa., a train of empty passenger cars ran into the rear of a freight train, wrecking the caboose and 1 car; engineer and fireman injured.

24th, on Chicago Great Western, at New Hampton, Ia., a local freight train standing at the station was run into at the rear by a through freight, wrecking the caboose and 3 cars. In the caboose of the work train were 6 trackmen and two passengers, of whom 6 were killed and the other two injured. The second train was not running very fast, but the car next ahead of the caboose was a platform which was broken and penetrated the caboose above the floor line.

27th, 2 a. m., on Western of Alabama, near Opelika, Ala., a passenger train ran into some freight cars which had escaped from a freight train which was switching and run uncontrolled down a grade, making a bad wreck, which caught fire and was mostly burned up; engineer and fireman killed, 2 postal clerks and 3 passengers injured.

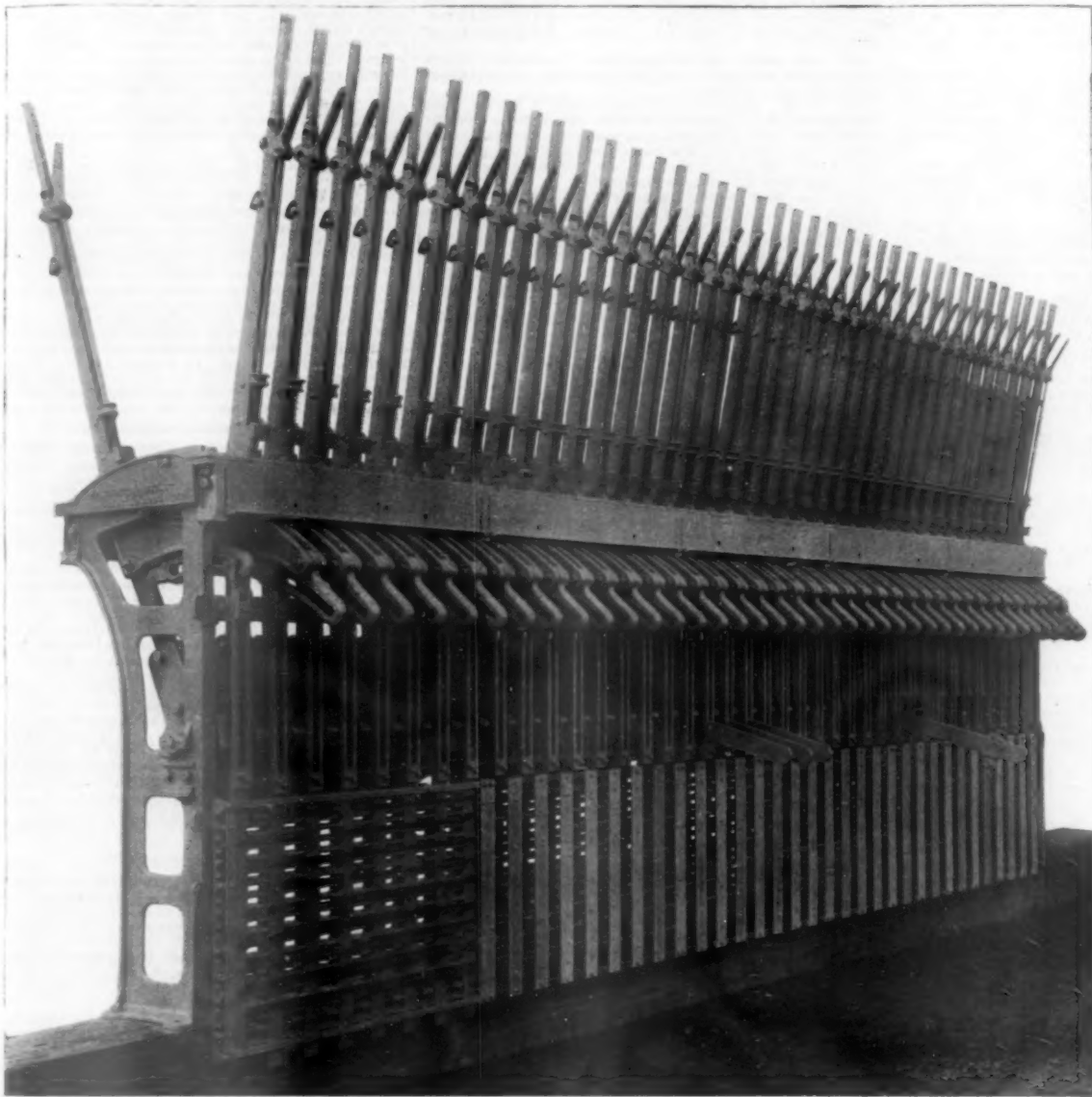
28th, on Toledo & Ohio Central, at Alexandria, O., a freight train standing at the station was run into at the rear by a following freight, and a passenger in the caboose was injured.

30th, 3 a. m., on Fitchburg road, at Waltham, Mass., a freight train broke in two and the rear portion afterward ran into the front part, wrecking several cars of live stock and merchandise. A man in charge of horses was injured.

And 23 others on 21 roads, involving 6 passenger and 37 freight and other trains.

BUTTING.
2d, on Long Island road, near Winfield, N. Y., butting collision between a freight and a work train, making a bad wreck and injuring 1 fireman. It is said that the work train was running on the time of the freight.

2d, on Louisville Southern, near Acton, Ky., butting collision of freight trains, wrecking both engines. One engineer was killed and both men on the other engine injured.



THE JOHNSON INTERLOCKING MACHINE.

Made by THE JOHNSON RAILROAD SIGNAL COMPANY, Rahway, N. J.

plication for patents in connection with the improved construction of the locking plate, etc. The locking system is one of the oldest, viz., the Stevens, but is actuated by the latch rod. All the locking is arranged in a single tier, and in a vertical plane, thus making the examination of the locking a very easy matter. There are only three styles of locking dog and these accomplish, very simply, all ordinary and special locking. Any part of the locking may be removed or altered without disturbing locking having no relation to the alteration.

The various wearing parts are of cold rolled iron and steel. As regards the latch actuation, the manufacturers claim that this machine has the simplest and most durable movement extant. They also claim that this machine has a considerable advantage over other machines in the accessibility of the locking for repairs or changes, and in the simple and strong form of the locking dogs.

It is generally acknowledged that the locking should be actuated by the preliminary action of the spring latch rod, and one of the most important reasons for this conclusion is that with direct attachment of the locking to the lever, it is often difficult to determine, when a lever cannot be moved, whether the working connection or the locking is holding it. In busy places unnecessary strain is often brought to bear on lever locking in such a case. By reference to the cut it will be seen that the intention of moving the main lever, as expressed by grasping the handle and raising the latch, will raise the tappet and effect all the locking of other lever latches necessary to the safe movement of the lever in question.

mercial success of this machine is to be attributed. As is well known by railroad men, the said combination of Stevens' locking with latch combination has been recently adopted by most of the signal companies, both in this country and abroad, and some of the railroad companies specify this pattern of machine for all contracts.

The Johnson Railroad Signal Company, of Rahway, N. J., will be glad to furnish drawings and complete information upon application.

Accidents in the United States in September.

COLLISIONS.

HEAR.

5th, on Western New York & Pennsylvania, near Avon, N. Y., a passenger train which had stopped to take on some cans of milk was run into at the rear by a freight, wrecking the rear car and damaging several others. Three trainmen and 1 passenger were injured.

7th, on New York, Lake Erie & Western, near Chester Hill, N. J., a passenger train ran over a misplaced switch and into some cars of stone standing on the side track, and 3 men working about the cars were injured, 1 fatally.

9th, on Lake Shore and Michigan Southern, in Toledo, O., a Michigan Central Passenger train ran into the rear of a Lake Shore freight, doing considerable damage and injuring the passenger engineer.

9th, on Savannah, Florida & Western, near Waycross, Ga., a passenger train ran into the rear part of a freight train which had become detached as the train started away from a wood station. The conductor of the freight and the engineer and fireman of the passenger train were injured.

10th, on Fitchburg road, at West Cambridge, Mass., a passenger train which was standing at the station or

2d, on Hannibal and St. Joseph, near Quincy, Ill., butting collision of freight trains, damaging both engines and 10 cars. Two trainmen and 2 tramps were injured. It is said that an operator who had orders for one of the trains gave a clearance card instead of the order.

3d, on Chicago, St. Paul, Minneapolis & Omaha at Mendota, Minn., butting collision between a passenger and a freight train wrecking both engines and several cars. The passenger engineer was injured.

8th, on Chicago, Burlington & Quincy, near Frederic, Ia., collision between a freight train drawn by two engines and a work train, making a bad wreck; three engineers were injured.

8th, 6.30 p. m., on Lehigh Valley, at Rochester, N. Y., butting collision between a freight train and a platform car loaded with laborers which was being pushed by a locomotive. The platform car was wrecked, and seven of the men injured.

8th, on Pennsylvania road, near Eckeroode's Mill's, Pa., butting collision between a passenger train and a work train making a bad wreck. The engineer and fireman of the passenger train and seven workmen on the work train were killed and four other employees badly injured. The work train was running on the time of the passenger train.

9th, on Louisville, New Albany & Chicago, near Lafayette, Ind., collision between a freight and a work train wrecking both engines and several cars. A man stealing a ride was killed and a brakeman was injured.

9th, on Southern Pacific, near Colfax, Cal., butting collision of freight trains, injuring 5 trainmen.

9th, on Great Northern, near Bonner's Ferry, Mont., butting collision between a freight and a work train; 1 brakeman injured. It is said that the work train was on the main track without leave.

9th, on Northern Pacific, at Van Asselt, Wash., butting collision between passenger trains, 1 engineer and several passengers being slightly injured. It is said that the south bound train ran past an appointed meeting point.

9th, on Delaware & Hudson, in Troy, N. Y., butting collision between a passenger and a freight train, a conductor being slightly injured. It is said that a passenger train ran past a fixed signal which was against it.

10th, on New York Central & Hudson River, at East Buffalo, N. Y., a passenger train ran over a misplaced switch and into the head of a work train. Several cars of cinders were wrecked and the main tracks blocked; 1 employee was injured.

13th, on Lake Erie & Western, at Bloomington, Ill., a freight train ran over a misplaced switch and into the head of another freight standing on the side track; a brakeman was fatally injured.

15th, on Chicago & Northwestern, at Marshalltown, Ia., butting collision of freight trains, wrecking both engines and 20 cars, mostly loaded. Three trainmen and 1 driver were killed and 3 trainmen injured. It is said that a mistake in giving telegraphic orders was the cause of the collision.

17th, on Delaware, Lackawanna & Western, near Newton, N. J., butting collision between a work train and an empty engine, killing a fireman. The empty engine had been reversed and deserted, and after the collision it ran back several miles.

17th, on Lehigh Valley road, near Penobscot, Pa., butting collision between a passenger train and an empty engine, badly damaging both engines and a baggage car; 1 engineer and 1 passenger injured.

21st, 3 a. m., on Pennsylvania road near Rheems, Pa., butting collision between a westbound express train and an eastbound train of empty cars, badly damaging the front portions of both trains. One fireman was killed and one engineer injured. The conductor and engine man of the eastbound train say they mistook a train, which they saw on a certain siding, for the westbound express.

21st, 3 a. m., on Pittsburgh, Fort Wayne & Chicago, near Shreve, O., butting collision between eastbound express train No. 8 and westbound freight No. 75, killing 8 trainmen and express messengers and 3 passengers, and injuring 1 engineer and 7 passengers. The passenger train was running fast and the freight train at considerable speed, and both engines, 5 cars of the passenger train and 5 of the freight were wrecked. The wreck at once took fire, presumably from a stove in an express car, and most of it was burned up. Some of the victims were burned to death. The conductor and engine man of the freight started out from a side track on the passage of the freight train, which they assumed to be the passenger for which they ought to have waited. It is said that they had been asleep.

21st, on Georgia, Carolina & Northern, near Athens, Ga., butting collision between a passenger train and a locomotive drawing a caboose, badly damaging both engines; 1 engineer, 1 fireman and 1 passenger injured.

24th, on Wabash road at Peru, Ind., butting collision between a passenger and a freight train, badly damaging the engine and wrecking 2 or 3 cars. The engineer and fireman were injured.

24th, on Chicago, Rock Island & Pacific, near Fairfield, Ia., butting collision between a freight train and a work train, wrecking both engines and 9 cars. One fireman was killed and other trainmen were injured. The work train encroached on the time of the freight.

25th, 1 a. m., on Philadelphia & Erie, at Lovell, Pa., butting collision of freight trains, one of which had just stopped to take water, wrecking both engines and several cars. One fireman was killed and 1 engineer injured. It is said that a mistake was made in giving telegraphic orders.

30th, on Boston & Maine, near Rochester, N. H., butting collision of freight train, wrecking both engines and 10 cars. An engineer and fireman were scalded and a man in charge of a car of horses was injured.

30th, on Milwaukee & Superior, near Menominee Falls, Wis., a butting collision between a passenger and a freight train, occasioned by a misplaced switch, resulted in the wrecking of 2 locomotives and several freight cars; 1 passenger and 1 brakeman injured.

And 11 others on 9 roads involving 3 passenger and 19 freight and other trains.

CROSSING AND MISCELLANEOUS.

3d, 1 a. m., at Central Square, N. Y., a freight train of the Rome, Watertown & Ogdensburg ran into a passenger train of the New York, Ontario & Western at the crossing of the two roads, wrecking 2 passenger and 2 freight cars, all of which were empty. The freight engineer was but slightly acquainted with the road, and was accompanied by a pilot who miscalculated the speed of the train when it was approaching the crossing.

5th, on Pennsylvania road near South Fork, Pa., collision between a stock train and a coal train badly damaging both engines and killing a brakeman.

7th, on Long Island road at Long Island City, N. Y., some cars which had been pushed upon a high coal trestle were not properly braked, and immediately

started down, following the engine which had just left them. The engineman seeing them come stopped his engine so as to prevent the cars doing greater damage elsewhere, but the shock of the collision opened the throttle, and before the runner got it closed, the engine had run into a string of passenger cars, wrecking 3 of them.

8th, on Pittsburgh, Cincinnati, Chicago & St. Louis, in Cincinnati, a collision of freight trains resulted in the death of one trainman.

9th, on Lehigh Valley, in Buffalo, N. Y., collision between a passenger train and a yard engine, badly injuring 4 trainmen.

10th, on Atchison, Topeka & Santa Fe, at Fort Worth, Tex., collision of yard engines, damaging both and injuring 2 trainmen.

18th, on Lake Shore & Michigan Southern, at East Buffalo, N. Y., a collision of yard engines resulted in the injury of a fireman.

19th, at Giddings, Tex., a Houston & Texas Central freight train ran into a freight train of the San Antonio & Aransas Pass at the crossing of the two roads, wrecking 8 cars and overturning the engine. A brakeman was killed.

21st, on Lehigh & Hudson, near Warwick, N. Y., a gravel train ran into a milk train, killing two workmen and injuring a conductor.

22d, a. m., on Chicago, Rock Island & Pacific, near Davenport, Ia., a passenger train ran into a freight which was pulling out of a side track on the passenger train's time, wrecking the engine and eight freight cars, and badly damaging three cars of the passenger train. The passenger fireman was injured.

27th, on New York, Lake Erie & Western, at Port Jervis, N. Y., a collision of freight trains resulted in the fatal injury of a brakeman and 2 others were hurt.

28th, on New York, Lake Erie & Western, at Adrian, N. Y., a freight train pulling out of a side track was run into by a fast freight on the main line running in the same direction, making a bad wreck and killing the fireman.

And 22 others on 17 roads involving 6 passenger and 38 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

4th, on Lehigh Valley near East Rush, N. Y., a freight train of 25 cars was derailed at a weak spot in the track on a new embankment and the whole train was ditched. The engineer was killed and the pilot and fireman injured.

12th, on Illinois Central, near Lincoln, Ill., a freight train was derailed by a broken rail and the caboose and two cars fell into Kickapoo Creek; one passenger in the caboose was fatally injured and the conductor and nine others were less severely hurt.

13th, on Illinois Central, at Sixty-third street, Chicago, a suburban passenger train was derailed at a point where the track was in bad condition. The engine was overturned and the engineer and a trainman were killed; seven passengers were injured. It is said that the roadbed was weak in consequence of insufficient filling of an excavation which had been made for a gas pipe beneath the track.

19th, on Baltimore & Ohio, at Thornton, W. Va., a passenger train running at high speed was derailed and the cars badly damaged. One passenger was killed. It is said that the rails spread.

22d, on Missouri Pacific, near Rich Hill, Mo., a passenger train was derailed by a defective frog and two passenger cars ran against some freight cars standing on a side track. One passenger was killed and another injured.

25th, on Wisconsin Central, near New Brighton, Minn., a passenger train was derailed by a broken rail, and the tender thrown down a bank. The engineer and 2 passengers were injured.

And 4 others on 4 roads involving 2 passenger and 2 freight trains.

DEFECTS OF EQUIPMENT.

4th, on Central of New Jersey, near Bound Brook, N. J., a heavy coal train was derailed by the breaking of an axle, 30 cars being wrecked. A tramp stealing a ride was injured.

5th, 5 p. m., on West Shore road, near Cranston, N. Y., a northbound passenger train was derailed by the loosening of a wheel on the forward truck of the engine, and the engine, baggage car and smoking car went into the Hudson River. The engine immediately sank out of sight, and the engineer and fireman were drowned. Two trainmen and 2 passengers in smoking car were injured. A number of persons in this car were submerged, and had to swim ashore.

12th, on Cumberland Valley, at Middlesex, Pa., a passenger train of 3 cars was derailed and badly damaged by the breaking of one of the axles of the tender; 5 passengers and 1 trainman were injured.

15th, on Southern Pacific, near Truckee, Cal., east-bound passenger train No. 3 was derailed by a broken wheel, 7 cars going off the track and 50 ft. of a snow shed being wrecked. It is said that a boy who was riding without leave on the blind platform of the baggage car first discovered the breakage and pulled the bell cord in time to mitigate the consequences of the accident.

25th, on Louisville & Nashville, near Hendersonville, Tenn., a freight train was derailed by a broken truck and 12 cars were piled up in a bad wreck. A tramp stealing a ride was killed.

28th, on Burlington, Cedar Rapids & Northern, near Maynard, Ia., 11 cars of a freight train were derailed by a broken truck, making a bad wreck and injuring a brakeman.

And 9 others on 9 roads involving freight trains.

NEGLIGENCE IN OPERATING.

1st, 6:15 a. m., on New York Central and Hudson River road, N. Y., the northbound fast mail train, No. 21, was wrecked at the drawbridge. It ran past the danger signals and upon sleepers of the draw, which was only partly closed, having just been opened for a vessel. The train was running rapidly, and its speed had been but slightly slackened when it went off the track, and the wreck was a very bad one. The engineer, fireman and 1 mail clerk were killed, and the conductor, brakeman and 4 mail clerks were injured.

7th, on Wheeling & Lake Erie, at Jewett, O., a freight train was derailed by a misplaced switch and 20 cars badly damaged; the engineer and fireman were injured. It is said that the switch had been maliciously misplaced.

8th, on Cleveland, Cincinnati, Chicago & St. Louis, at Enon, O., a freight train was derailed by a misplaced switch, the engine and 24 cars being wrecked. The wreck took fire and the engineman was burned to death.

12th, on New York, Susquehanna & Western, at Two Bridges, N. J., the rear car of a passenger train was de-

railed and overturned by the misplacement of a switch while the train was moving over it; one passenger was badly injured.

12th, on New York & New England, near Waterbury, Ct., some cars being pushed upon a high coal trestle ran too far and went off the end of the track; there was a dense fog at the time and the engineman and fireman, getting an imperfect idea of the danger, jumped off; but just then all the cars but one broke away from the engine. This one car and the engine then ran forward down the incline and ran over a mile on the main track. The runaway was stopped by a brakeman, who had remained on the front car.

13th, on Pennsylvania road, near Monmouth Junction, N. J., the two rear cars of a passenger train were derailed at a facing point switch, which was not fastened. One car ran against a freight train on an adjoining track. A track walker was killed and a brakeman injured. One man was injured by jumping out of a window.

13th, on Pittsburgh, Cincinnati, Chicago & St. Louis, in Cincinnati, O., the larger portion of a train of 38 empty freight cars was derailed by the sudden application of the brakes by the engineman to avoid striking a wagon. The train was running along Front street, near Broadway, and the fronts of several stores were broken in by the derailed cars. It is said that the train was going 25 miles an hour; two trainmen were injured by jumping. The wreck broke some electric light wires, and a man had his finger burned off by taking hold of one of them.

18th, at Hobart, Ind., a passenger train of the Pittsburgh, Fort Wayne & Chicago was derailed at the crossing of the Elgin, Joliet & Eastern, and the engine was ditched; engineer and fireman injured. The reports indicate that the train ran past a danger signal at the crossing, and was thrown off by the derailling switch.

25th, on Union Pacific, at Cheyenne, Wyo., several cars of a freight train were derailed at a split switch which had been left unlocked, and several cars of horses went down a bank. Two trainmen were injured.

30th, on Lake Shore & Michigan Southern, near Oberlin, O., a work train was wrecked by running upon a small bridge which was undergoing repairs. Three trainmen were injured. It is said that the bridge men sent out a flag, but that it was not carried far enough.

And 7 others on 7 roads involving 2 passenger and 5 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

14th, 4 a. m., on Norfolk & Western, near Basic City, Va., a passenger train was derailed by sand which had been washed upon the track, and the engine and first 2 cars wrecked. The next 3 cars were badly damaged, Conductor, engineer and fireman killed and 3 passengers and 2 trainmen injured.

19th, 1 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, at Dayton, O., a train of freight cars being pushed by a yard engine was derailed by a cow on the track, and the conductor was killed; a brakeman was injured.

20th, 12:16 a. m., on Philadelphia, Reading & New England, near New Hartford, Conn., 12 cars of a freight train were wrecked by an explosion of dynamite in one of the cars. A hole 20 ft. deep was made in the ground, and the wreck was a very bad one. A brakeman riding on the car containing the explosive was blown some distance, but not much hurt. The shock of the explosion was heard 35 miles away.

21st, 3 a. m., on Atchison, Topeka & Santa Fe, near Osage City, Kan., a passenger train of 9 cars was entirely derailed and the first six cars wrecked by a loose rail; engineer, fireman and 2 express messengers killed and 18 passengers and 4 trainmen injured. The bolts and spikes had been carefully removed from a rail, presumably by persons who had hoped to rob the train.

And 5 others on 5 roads involving 2 passenger and 3 freight and other trains.

UNEXPLAINED.

4th, on New York, Ontario & Western, near Peckville, Pa., a freight train was derailed and 12 cars fell into the Lackawanna River. Two cars of oil became ignited and a portion of the wreck was burned up. One brakeman was killed.

9th, on Missouri Pacific near Independence, Mo., a freight train was derailed and 14 loaded cars badly wrecked; the engineer was killed and the fireman injured.

11th, on Central of New Jersey, in Jersey City, N. J., the rear car of a passenger train was derailed, injuring 2 passengers.

12th, on Pittsburgh & Western, at Youngstown, O., a freight train was derailed and a part of the wreck fell upon the adjoining track of the Pennsylvania, where it was struck by train No. 78 of that road. The engineer and fireman of the latter train were thrown into the river, but came out uninjured.

13th, on Illinois Central at Watford, Miss., a freight train was derailed and a brakeman killed.

16th, on Union Pacific, near Portia, Kan., 2 cars of a passenger train were derailed and one of them badly damaged. Several passengers were injured.

21st, on Burlington, Cedar Rapids & Northern, near Ocheyedan, Ia., a freight train was derailed while running at high speed, and the engine and 16 cars went down a bank. Three passengers were killed.

25th, on Union Pacific, near Cheyenne, Wyo., a freight train was derailed and 17 cars were ditched. Several cars of horses were wrecked and two of the attendants were injured.

And 25 others on 21 roads involving 5 passenger and 20 freight and other trains.

OTHER ACCIDENTS.

24th, on New York, New Haven & Hartford, at New London, Ct., the steam chest of a switching engine exploded, and the cover, which was thrown high in the air, fell upon a brakeman riding on the tender, killing him instantly.

30th, on Buffalo, Rochester & Pittsburgh, near Grove Summit, Pa., a freight engine was wrecked by the explosion of its boiler, and the engineer and fireman killed.

And 4 others on 4 roads, involving 3 passenger and 3 freight and other trains.

A summary will be found in another column.

A Large Coal Barge.

The largest coal barge ever constructed is now being built at the Morse yard. It will be ready for launching about Christmas and will carry nearly 5,000 tons. For facility in handling cargoes, the middle of the deck is really a long string of hatches, so that half a dozen hoisters can be unloading at the same time or an equal number of chutes loading. Thus the cargo, to a great extent, trims itself, and but little strain is brought upon the hull either at loading or discharging.

Railroad Track for City Streets.

The illustrations show designs for laying railroad track in city streets, prepared by Mr. Walter Katté, Chief Engineer of the New York Central & Hudson River Railroad. They are given as likely to be of interest to such of our readers as have to struggle with the problem of laying a durable track for railroad traffic through city streets, which will at the same time not incommode street travel. This design is now being used in several places by the New York Central & Hudson River Railroad. Its fundamental peculiarity is a continuous inside angle bar. The chair or raising block used is the Dugan chair made by the Burnham & Duggan Railway Appliance Co., of Boston. It can be placed in position permanently and the rail removed, by driving back the malleable iron clamp. A chair is used on each end of each tie, and six larger chairs are required for each 30 ft. to accommodate the outside angle bars.

Recent Great Passenger Movements.

Some extraordinary things in the way of carrying passengers have been done within the last few months. The Denver Conclave of Knights Templar caused a tremendous passenger movement; but a greater and more concentrated movement was caused by the Grand Army convention at Washington last month. The Christian Endeavor Convention in New York caused a great flow of travel for some days; and then last week, came the Columbus celebration at New York, during which great numbers of people were taken into and out of the city, especially on the third day, when the military parade was held. This week the Columbus dedicatory ceremonies are held at Chicago and another big passenger record will be made.

Up to this present time, the figures received of all these great movements are very incomplete, and indeed it will be difficult if not impossible to ever collect facts and figures from all of the railroad companies to give a very precise notion of what was done, and of the cost and method of doing it. We are told that the Baltimore & Ohio put into Washington in six days 120,000 people, and that the other railroads probably carried there about the same number. This business was done without any serious accidents so far as we have heard. Of course, there were many delays to trains both going and coming, and these delays affected arrivals of regular trains at other terminals than Washington. It will be remembered that both the Baltimore & Ohio and the Pennsylvania partially suspended freight business for a number of days; otherwise it would have been impossible to handle the passenger traffic at all, to say nothing of delays. These interruptions to the regular movement of freight and passengers, and particularly to the regular movement of freight, continued for a considerable time after the special travel to and from Washington had ceased, for the partial suspension of freight traffic caused congestion of cars both loaded and unloaded at many points; but, as we have said, there were no serious accidents, and the matter therefore becomes a purely financial question as to whether or not it pays to encourage such great movements of passengers.

The same thing is true of the movement to and from New York during the Columbus celebration. Enormous numbers of people were taken into and out of the city with nothing worse than more or less crowding and delay, although it is proper to say that the delays were small, and the regular movement of trains was well maintained except at the very end of the celebration. On Wednesday night the concentration of travel was so great that people were frequently much delayed and inconvenienced in getting out to the suburbs.

Following are some figures of the passenger movement to New York by various railroads:

Pennsylvania Railroad.			
Rail Passengers.	Ferry Passengers.	Total.	
Oct. 10.....	25,528	45,988	71,416
Oct. 11.....	27,022	47,553	74,575
Oct. 12.....	41,387	72,031	113,418
Total.....	93,937	165,572	302,400

Daily average, Oct. 1 to 12..... 24,098 36,520 60,617

It will be seen that the passengers by rail on the 12th exceeded the average by 85%, and the total rail and ferry passengers were 80% above the average.

Erie.			
Oct. 10.....	18,011	by rail to Jersey City.	
Oct. 11.....	19,063	"	
Oct. 12.....	22,975	"	
Total.....	60,049	"	
Average (usual) 16,000—about.			

The ferry passengers from Jersey City to New York are not given. The greatest day's business was 44% above the average.

New York, New Haven & Hartford.			
Oct. 10.....	9,713	to Grand Central Station.	
Oct. 11.....	10,479	"	
Oct. 12.....	11,314	"	
Total.....	31,506		
Daily average.....	7,000		

The greatest day's business was 61 per cent. above the average.

Central of New Jersey.			
Oct. 10.....	19,658		
Oct. 11.....	22,250		
Oct. 12.....	30,024		
Total.....	71,932		

Long Island (approximate).

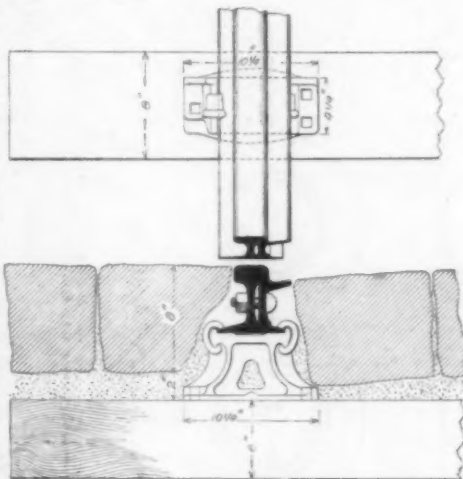
Oct. 10.....	25,000
Oct. 11.....	25,000
Oct. 12.....	30,000
Total.....	80,000

The Long Island figures we receive by telegraph just before going to press, and they are said to be only approximate.

Manhattan Elevated.

But the greatest triumph of all in the New York affair was achieved by the elevated railroads of that city. The Manhattan system carried in three days 2,621,864 passengers—an average of nearly 874,000 passengers a day. The greatest number carried in any one day was Wednesday, the 12th, when 1,075,537 people were carried. The greatest number of passengers carried in any one previous day was April 30, 1880, when 835,721 people were carried.

The following table, showing the trains run and the train, engine and car mileage on the Manhattan Elevated system, will be found interesting. The Third Avenue line is 8.48 miles long. On this track over 54,000 car miles and almost 12,000 engine miles were made in one day. The Sixth Avenue line is 10.76 miles long, and the greatest car and engine mileage was 48,658 and 10,314 miles respectively.



Railroad Track for City Streets.

TRAIN AND MILEAGE STATEMENT FOR OCT. 10, 11 AND 12, 1892. (Columbus Celebration.)

Lines.		Dates.	Trains Run.	Train Mileage.	Cars Run.	Car Mileage.	Engine Mileage.
Suburb. Branch.		10th	370	1,378.19	956	3,559.64	1,469.14
(3.7 miles)		11th	370	1,378.19	954	3,552.22	1,469.14
		12th	370	1,378.19	1,040	3,871.28	1,469.14
Total.....			1,110	4,134.57	2,950	10,983.14	4,407.42
2d Avenue.....		10th	690	5,405.82	2,322	21,870.24	5,653.38
(5.76 miles)		11th	640	5,570.84	2,612	22,619.19	5,794.50
		12th	776	6,506.48	3,128	26,379.94	6,794.14
Total.....			2,096	17,513.14	8,252	70,869.37	18,242.02
3d Avenue.....		10th	1,038	8,434.42	5,080	40,543.46	9,130.08
(8.48 miles)		11th	1,040	8,516.50	5,140	40,988.80	9,215.16
		12th	1,422	11,125.78	7,000	54,061.60	11,821.44
Total.....			3,499	28,076.70	17,220	135,613.86	30,166.68
6th Avenue.....		10th	1,188	9,972.54	5,896	48,655.80	10,314.20
(10.76 miles)		11th	1,050	9,153.80	5,106	44,521.70	9,495.46
		12th	1,242	9,876.72	6,030	47,500.48	10,218.38
Total.....			3,480	29,003.06	17,032	140,677.98	30,028.04
9th Avenue (10.07 miles).....		10th	544	5,031.94	2,190	20,138.42	5,241.94
		11th	530	4,798.62	2,128	19,189.30	5,008.62
		12th	498	4,527.74	2,062	18,067.70	4,737.74
Total.....			1,572	14,358.30	6,380	67,435.38	14,988.30
Total, all lines.....		10th	3,750	30,223.91	16,614	134,787.56	31,788.74
(41.78 miles)		11th	3,630	29,421.95	15,990	130,871.08	30,968.88
		12th	4,308	33,475.91	19,230	149,912.00	35,040.84
Total.....			11,688	93,121.77	51,834	415,570.64	97,816.46

Of course the elevated railroads were very much crowded and considerable inconvenience was endured by passengers, but nobody of any sense would expect anything else. There was one accident which resulted rather seriously, one passenger train having been stopped unexpectedly, a following train ran into it and a number of people were injured, none of them fatally, however. There have been various explanations made of this accident, but the facts seem to be that the attention of the engineer of the second train was momentarily drawn away by a passing band in the street below, and that moment was just enough to make the trouble. If this is true, and after considerable inquiry we believe it to be so, the accident is one that could not have been prevented by anything short of a derailing switch.

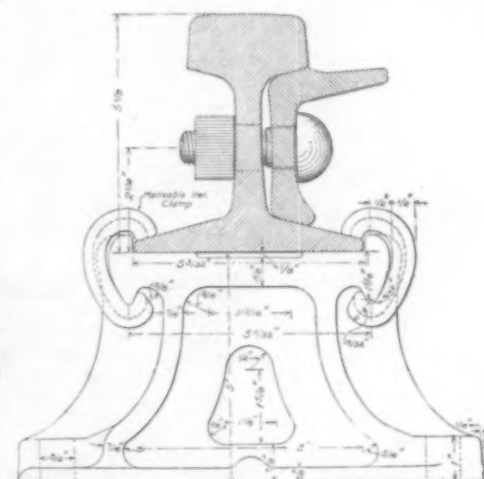
On the whole, the managers of the elevated railroads of New York are to be heartily congratulated on the magnificent organization and discipline which enabled them to perform this feat hitherto unparalleled in the history of transportation, and the public of the city of New York ought to recognize what an extraordinary service it gets from these elevated railroads. To a certain extent it is being recognized by the daily newspapers, as the following quotation from the New York Evening Post will show. The Post, it must be remembered, is by no means a partisan of the elevated roads. Indeed we do not remember ever to have seen in its columns any

expression of unqualified approval of anything that those roads have done before this last performance:

"We regret to see a disposition, on the part of a morning contemporary, to disparage the work done by the elevated railway during the Columbus celebration, and even to create a prejudice against the managers of the same. Let anybody ask in what condition New York would have been during the past three days without the elevated railways, the surface roads being largely crippled by having their lines interrupted by marching or standing crowds. Let him then ask whether it was possible, with the existing tracks and rolling stock, to render any better service than was rendered. Here is the whole question in a nutshell. We think that all impartial persons will agree that the service rendered by the officers and operatives of the elevated has been something wonderful, and that the statistics of passenger movement, when they come to be published, will surpass anything that the world has ever seen in an equal space of time, and that, too, with the minimum of accident and delay."

New York & Brooklyn Bridge.

We have received a detailed statement of the passengers carried by the New York & Brooklyn Bridge Cable Railroad for the whole week, which we shall give in full next week. Meanwhile we give the figures for the three heavy days, and also for the same days of the week before:



Railroad Track for City Streets.

	Monday, Oct. 10.....	Tuesday, Oct. 11.....	Wednesday, Oct. 12.....	Preceding week.
Total.....	188,677	158,085	223,625	167,121
	570,387			507,116

Shop Notes.

The Brown Hoisting & Conveying Machine Co. has a manufacturing plant at Cleveland, which is an excellent example of modern practice in shop construction and management. The shops are large, well lighted and well equipped with modern tools suitable for the class of work which the Brown Co. turns out. Most of these tools were made by various well known tool builders in this country, but some of them, as, for example some punches and shears, were made by the Brown Co. itself. Among other machine tools may be noted two circular planers, which are said to be very satisfactory. The riveting on the Brown conveyers is done almost entirely by means of pneumatic riveters.

A novel overhead traveling crane is in use in these shops. This consists of a long carriage, formed of two wooden stringers, placed a few feet apart, with suitable truss rods, and which runs on the tie beams of the roof, and extends the whole length of the shop. This carriage is moved across the shop as occasion requires, and on it is a small traveler for moving loads lengthwise of the shops. This system, which is the reverse of the ordinary practice of traveling cranes, is found to work very satisfactorily here, as most of the transferring of material is along the length of the shop, and the transverse motion is small.

The drawing room at these works is directly over the offices, and is very well lighted and arranged, and contains a large vault, which is in the centre of the room, and in which all tracings are filed. The tool room is well arranged, and the check system is used.

The works of the Cleveland City Forge & Iron Co., is one of the most interesting places which an engineer can visit. At present there is the usual amount of heavy forging on hand, one of the most notable pieces of work, on account of the complex forging, being the rudder for battle ship No. 2 for the United States Navy. The finished rudder will weigh 13½ tons. The stern post and stern frame forgings for the new twin screw passenger steamers for the Great Northern line are also being made here, as well as numerous forgings for other lake boats, including the shafting for the World's Fair whaleback steamer. It will be remembered that these works made the second shaft for the Fall River steamer "Pilgrim," the weight of which is 35 tons. A piece of forging which is even more interesting than this, however, is a sugar mill shaft which was turned out about two years ago, which is 30 inches in diameter at the

bosses and 14 ft. 6 in. long, weighing 20,700 lbs., or over a ton to the foot of length. The sugar mill for which this was made has crushed from 600 to 800 tons of cane per day. A good idea of the size of the mill is obtained from the fact that the coupling shafts are 24 in. square, and are larger than those of any rolling mill in the country.

At these works there are 21 steam hammers, varying from 500 lbs. to 12 tons in weight of drop. Some of the machine tools which are particularly notable on account of their size and completeness are a Bement & Miles lathe, which will swing 10 ft. in diameter, and will take 35 ft. between the centres; a Scotch lathe, having double heads and a bed 60 ft. long, which will take a cut 4 in. deep with $\frac{1}{8}$ -in. feed, and a lathe very similar to this, which has been remodeled at these works from the form in which it was originally used at the Roach shipyards.

The axle department of these works has a capacity of about 100 axles per day, working on single turn.

The Industrial Works, Bay City, Mich., is building an electric transfer table for the Depew shops of the New York Central, which is 80 ft. long and has a capacity of 100 tons, and is, we believe, the largest transfer table built to date. It is equipped with a Thomson-

circles, and for convenience of comparison parallel projecting lines giving the date of turning, reduction and mileage between turnings and per $\frac{1}{8}$ of wear, are shown. At the base of these lines the total reduction and mileage are given with the average mileage per $\frac{1}{8}$ in. of total reduction.

While the mileage per $\frac{1}{8}$ in. reduction gives a fair means of comparison for wheels of the same diameter, it is obviously not a fair comparison for wheels of larger or smaller diameter. Total tread wear area is therefore found by subtracting the area of the circle, having a radius equal to that of the worn tire at its lowest point or flat spot after its last turning from a circle having a diameter equal to that of the new tire without reference to the width of the tire. Tread wear area between turnings referred to mileage is found by calculating the difference in area of the circles to which the tires are turned and dividing the same by the mileage between those turnings. This will give what might be called radial square inches worn away and would be represented by a ring equal to the amount worn from the tire as measured from the line $2\frac{3}{4}$ from the inside edge of the tire. A square inch in such a ring for a

4-in. tire on a 44-in. wheel center new is	$\frac{1}{8}$ in. thick.
4-in. worn to 1 in. thick 44-in.	" " "
4-in. tire on a 56-in. " " " "	" " "
4-in. worn to 1 in. thick 56-in. " " " "	" " "
4-in. tire on a 57-in. " " " "	" " "
4-in. worn to 1 in. thick 57-in. " " " "	" " "
4-in. tire on a 63-in. " " " "	" " "
4-in. worn to 1 in. thick 63-in. " " " "	" " "

rail as influenced by the centrifugal force of the balance. In that manner I think it is much easier to trace these connections and to follow the argument than it would be in the form represented by Mr. Herr.

I find that universally, with our eight-wheel engines, the flat spots occur between 90° and 120°. I have completed a list of the measurements of the flat spots and their locations, which is embodied in the accompanying table. Engine No. 2 was one of the engines that were employed on the hilly portions of the road east of Savannah, and we all know that the speed with which that engine runs at times is as great as it is on the main line, if not greater. In one instance, when the wheels were turned, they showed no flat spot, and on the next turning showed a very slight one.

Now with our switch engines the flat spots were imperceptible. In those where the flat spots occurred they had no uniform location with reference to the division of the circle, but were evidently due entirely to some defect in the tire.

Mr. FORSYTH: We are certainly indebted to Mr. Herr for the formula and method presented in his paper for determining the forces which produce slip and wear in locomotive tires; also to Mr. Lewis for his study of the paper. There are several questions which I would like to ask both Mr. Herr and Mr. Lewis, in order to make clear a few things that seem now uncertain in Mr. Herr's paper. I do not understand exactly what is meant by the average overbalance weight at the crankpin. Is it an overbalance above that which the balance should be, as calculated by the regular rule, or is it the weight

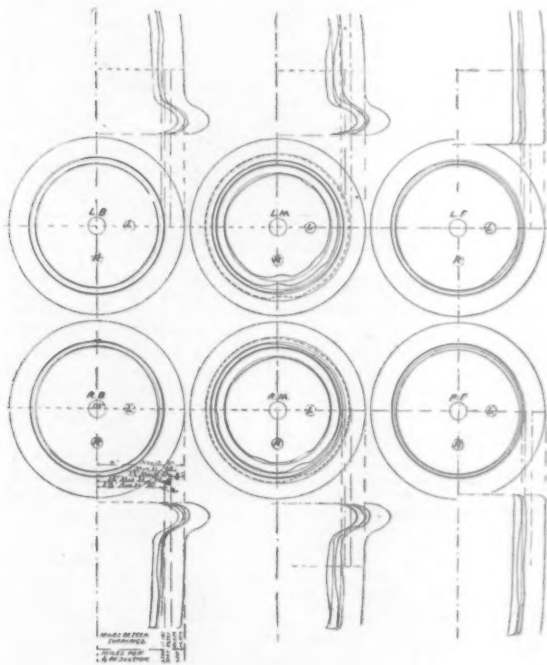


Fig. 1—Diagram from C., B. & N. Engine No. 150.

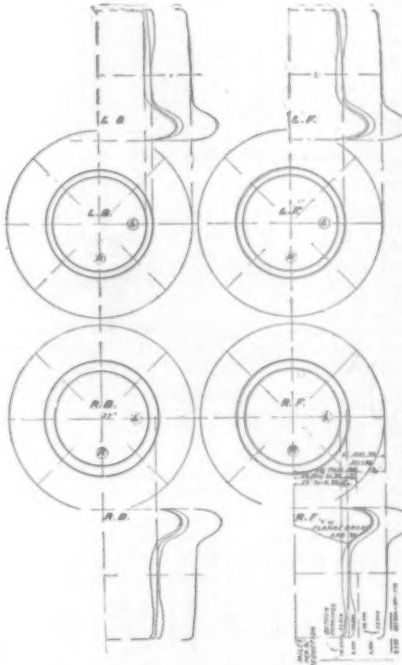


Fig. 2—Diagram from C., B. & N. Engine No. 60.

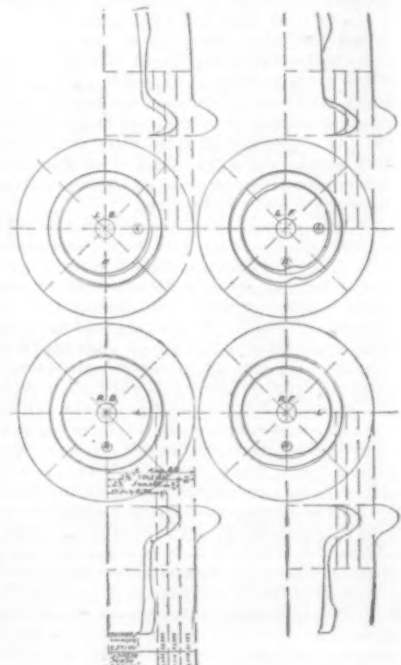


Fig. 3—Diagram from C., B. & N. Engine No. 69.

Houston motor, with the Industrial Works' system of connections and gear for propulsion of the table and for pulling loads on and off.

Other notable pieces of work on hand at these shops are: An electric driven transfer table 70 ft. long and of 100 tons capacity, for installing exhibits in the transportation department at the World's Fair; a 50-ft. electric transfer table of 75 tons capacity for the Illinois Central's Burnside shops; a 72-ft. steam transfer table of 75 tons capacity for the Chicago, Rock Island & Pacific railroad; a 35-ton wrecking crane for the Chicago & Western Indiana; wrecking cranes for the Allegheny Valley, and the Adirondack & St. Lawrence; and 7 steam locomotive cranes of from 7 to 15 tons capacity for use in installing exhibits at the World's Fair. The Industrial Works has recently shipped wrecking cranes to the Great Northern, the Lake Shore & Michigan Southern, the Chicago, Burlington & Quincy and the Terre Haute & Indianapolis.

Irregular Wear of Locomotive Driving-Wheel Tires.

At the September meeting of the Western Railway Club Mr. Herr's paper, read at the May meeting, was discussed as follows:

Mr. W. H. LEWIS: I had already given this subject considerable attention before Mr. Herr presented this paper at the club at the May meeting, and have for some time past taken records of all worn drivers on our line. I have here to-day a large number of these records in the shape of diagrams. These circle diagrams are taken with the instrument illustrated and described in the June, 1891, issue of the *Railway Master Mechanic*, and give the actual measurement and location and extent of flat spots by radial measurement from the centre of the wheel; and while this circle may be considered to represent the driving wheel on a reduced scale, the variation and depth of flat spots are shown to their full extent and positive location with reference to the centre line of crank pins, that might be drawn on the diagram, each radial line at the same time representing the actual thickness of the tire at that point, thereby eliminating the errors that are sure to occur in the usual methods of measurement. In the arrangement of these circle diagrams the engine is supposed to be standing with its right side presented and the right crank pin on the lower quarter (the left crank pin on the forward centre) and the rotation in the direction of the arrows when the engine is running forward. The cross section diagrams are taken from the point most worn and serve to show the actual wear between turning. The arrangement of these cross section diagrams correspond to the

Hence you will see from the above that mileage per $\frac{1}{8}$ of wear is not an equitable basis for driving wheels of various diameters, and the proper comparison of miles run per square inches of material worn, which is obtained by dividing the total mileage by the means of the tread areas given above. To illustrate: The total wear of a 4-in. tire on a 44-in. centre is 990 sq. in. when worn to 1 in. in thickness, while the same thickness of tire worn on a 63-in. centre is 1,344 sq. in.; thus, you will see, that there is 354 sq. in. more worn from the large wheel than the smaller.

In my presentation of this subject at the meeting of this club in April, 1890, I presented drawings of the irregular wear of the tires of engine 150, and on page 154 of the report of that meeting is given the weights of the counter balance of this engine. You will notice that this engine then had balanced almost the entire weight of the reciprocating parts. For the purpose of determining the effect, I removed 585 lbs. from the forward and back drivers, reducing them to that necessary for the actual revolving balance only. The main drivers contained but 44 lbs. in excess of the revolving balance. I present herewith (fig. 1) drawings of three (3) turnings of these tires since the change from which you will see that the effect, so far as reducing the irregular wear, was imperceptible, and that the flat spots developed to the same extent and in the same location as before. I have also discovered that while both 8 and 10-wheel engines develop these flat spots when in service on that portion of the road having a low maximum grade (3-10 percent.), they not do it upon hilly divisions or in other than regular service. This would seem to indicate that these flat spots were due more to hard continuous service than to the effect of the counter-balance at high speeds.

I have number of these diagrams taken from different classes of engines, both on the main line, where, as I have stated, the grade is low, and also on the road east of Savannah, which is hilly; also from one engine of exactly the same counter-balance as the engines on the main line which was used exclusively in suburban service, where the speed was supposed to be as high as it was on the main line. That is engine 60 (fig. 2). It shows no indication of a flat spot; the tires are worn perfectly round.

The paper that was presented at the last meeting by Mr. Herr, I must say, evidences deep thought and close application and study of the subject, and the figures given by him bear out fully his theory in regard to developing flat spots.

In following out the data and diagram presented by Mr. Herr at this meeting, I found that it was very confusing to retain the connection and location of the points mentioned, and to simplify the matter I condensed his tables into the circular diagram shown in fig. 4, the circular representing the driving wheels divided in the same manner as described by Mr. Herr. The line of rotative force is located nearer the centre of the circle than the one showing the pressure on the

in excess of that which is necessary to balance the revolving weight? The term "overbalance" does not appear to be clearly defined. I would also like to know if these engines from which records were taken have driver brakes, and if so, what kind of shoes were used.

Mr. LEWIS: All of the engines referred to by me have the Ross-Mehan shoe, so that there is no brake-shoe contact upon that part of tread that comes in contact with the rail.

Mr. FORSYTH: From Diagram 5, on page 183 of the May proceedings, I understand that the lowest spots in the tire, are only from .04 to .07 of an inch deep. This being the case, these irregularities do not seem to me to be very serious. I am not sure from the data given, whether the maximum of .07 of an inch would have to be turned off each side of the wheel or whether the whole diameter would have to be reduced that amount in order to true the tire; but whichever it is, the irregularity of the wear of the tires on this large number of engines would seem to be quite small; perhaps only 1-12 of an inch would have to be turned off in order to true them up. I take it that the engines were not brought in especially for tire turning, but that they had been out long enough to make a good mileage and require a general repairs. If that is the extent of this irregularity, it is certainly not a serious thing. Now, if it is a fact that these engines were over-balanced 170 lbs. in the front and back wheels, and did not produce any greater irregularity of wear in their tires than these diagrams indicate, it certainly brings out the important point that an engine can be very badly balanced without producing a bad effect on the tires. I have compared this wear with some of our own engines, which are balanced according to the rule given in the paper, and I find that the wear is just about the same; so that the conclusion that I draw from this paper and from Mr. Lewis' experiments, made with engines without the reciprocating parts balanced at all, would be as stated above—that an engine may be incorrectly balanced without producing very irregular wear of its tires.

The conclusion in Mr. Herr's paper that 11,000 lbs. pressure produced but little abrasion, confirmed by the measurement of a large number of engines, is one which I do not think we would dispute at all. That is a confirmation of Mr. Barr's statement in his paper read before the club in January, 1891. Mr. Herr's first conclusion, that the weight of reciprocating parts and consequent over-balance should be as light as possible, is one we all accept as desirable, not only because of tire wear, but for the good riding of the engines. With reference to his second proposition, that as small a portion of the reciprocating parts should be balanced as is conducive to smooth working, I would like to ask Mr. Herr if, as these engines went through the shop, it was thought necessary to change the counter-balance, and if this extra weight in front and back wheel was removed; and also in his study of the question, whether this irregular wear of tires is important enough to still further reduce

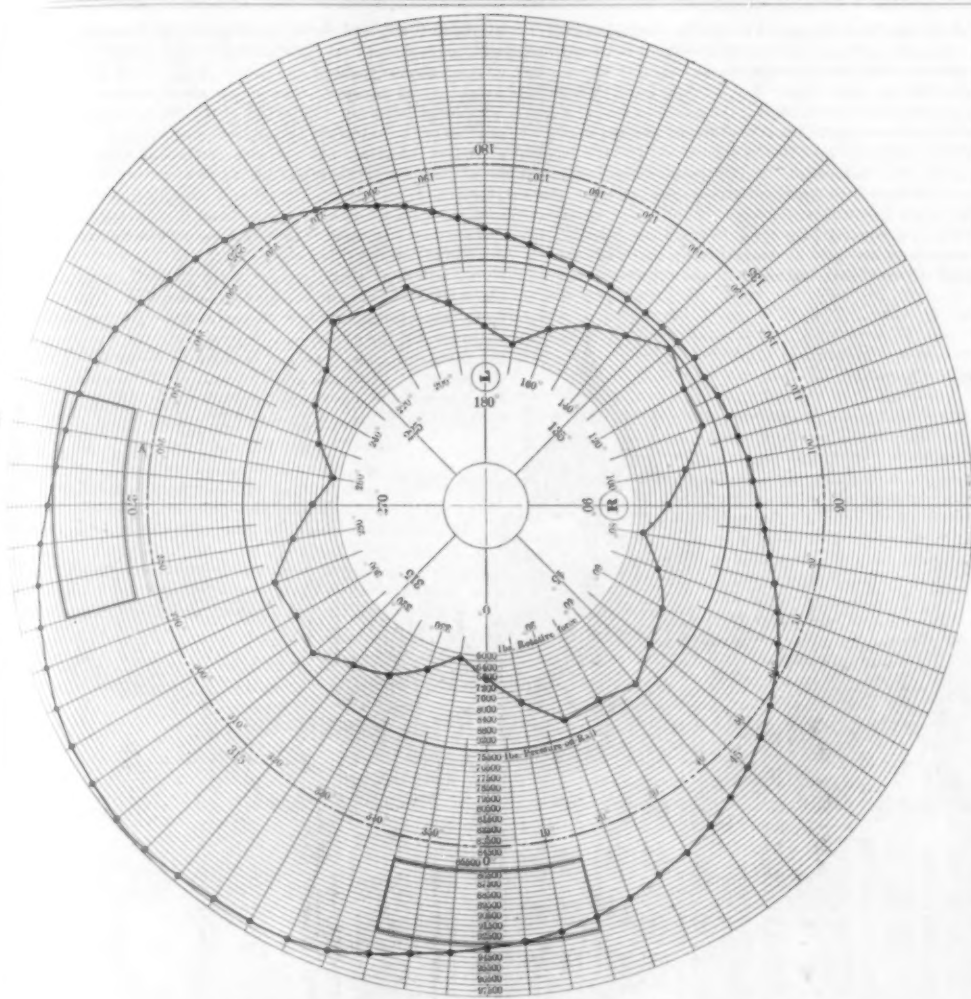


Fig. 4—Diagram Showing Rotative Force and Pressure on Rail.

the amount of reciprocating balance (% of the reciprocating parts) which is distributed among the wheels.

Mr. HERR: Before answering Mr. Forsyth's questions, I would like to call attention to some typographical errors in the formula printed on page 177 of the May proceedings.

The formula and notation should have been as follows:

NOTATION.

- P. Pressure of each wheel on rail.
- W. Weight of each wheel on rail, engine at rest.
- C. Centrifugal force of over-balance.
- R. Rotative force at rail from one cylinder.
- A. Acceleration of reciprocating parts.

p . Resultant pressure against piston.

- S. Length of stroke.
- n . Ratio of length of main rod to length of crank.
- D. Diameter of drivers.
- α . Angle of crank with horizontal.

$$P = W - C \sin \alpha + \frac{(p + A)}{\sqrt{\frac{n^2}{\sin^2 \alpha} - 1}}$$

$$R = (p + A) \left[\sin \alpha + \frac{\cos \alpha}{\sqrt{\frac{n^2}{\sin^2 \alpha} - 1}} \right] \frac{S}{D}$$

I also find another error; possibly it was my own as I was very busy at the time these diagrams were given out and I trusted the plotting of the curve showing the coefficient of slip to other persons; the figures shown at the left of the lower curve on pages 182-3 (May proceedings), .09, .10 and .12 should have been .06, .09 and .12. It doesn't check up with the data shown in the table. The figures shown in the table are correct, but the curve does not exactly correspond with them. I plotted out another curve on a better scale, for each of these lower curves on diagrams 3 and 4, and they are shown here-with (fig. 5).

Answering Mr. Forsyth's inquiry in regard to over-balance, I will state that weight given is the actual average overbalance in 32 engines, determined by weighing the wheels on straight edges, and the weight given is the average weight that was required to be hung on the crankpin to balance the counter-balance; in other words, it is the actual static over-balance without any consideration of reciprocating parts. Of course the wheels were not all uniform. Some were over-balanced statically more than 400 lbs.; others had just about enough static over-balance to equal the amount of balance that would be added by balancing two-thirds of the reciprocating parts distributed between each wheel, but they all agreed in being over-balanced in the forward and back wheels and under-balanced in the main wheels.

In regard to the amount of wear shown in diagram No. 5, in the May proceedings, Mr. Forsyth is exactly correct; it is small. But it must be borne in mind that this wear is the average wear of all these engines. Some of them on account of their being balanced differently were worn less at the particular point of maximum wear shown on the diagram, and greater at points slightly away from that particular point. Of course the tendency of averages is to reduce the maximum wear shown in any particular case. The figures given show the average wear from a true circle.

I would also say, in answer to Mr. Forsyth, that it was considered necessary to change the counter-balance in the engines passing through the shop. In regard to the slight degree in which the counter-balance effects

the irregularity of the wear, it is true that it is not much, as far as the counter-balance hammer is concerned. In that way it has small effect and I consider it entirely negligible. If the tendency to slip could be avoided I do not think the irregularity would be perceptible, even if the engine was badly over-balanced. But the bad effect of badly-balanced engines, as far as irregularity of wear of tires is concerned, comes from the very irregular pressure of the wheel upon the rail and the greater tendency of the engine to slip, due to the reduction of weight upon the wheel and consequent lack of adhesion. In a badly-balanced engine the spots on the tire are worse than in a well-balanced engine.

The curve of co-efficient of slip for 30 and 40 miles an hour shows an interesting principle which I would like to call attention to. At 30 miles an hour the maximum co-efficient slips is just .12. At 40 miles an hour, although of course the mean effective pressure at the highest speed is less, the co-efficient slip reaches .1272 at 130 deg. in this particular engine. If the speed was increased to 50 miles an hour, the co-efficient of slip would rise still

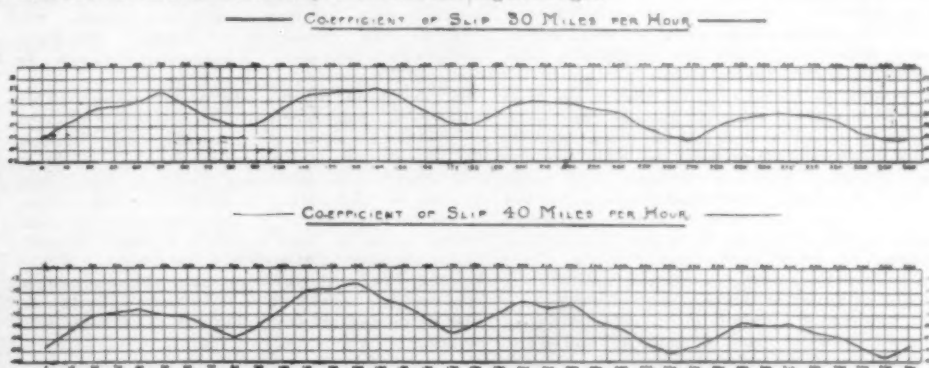


Fig. 5.

higher, and at a very high rate of speed would undoubtedly eventually equal the coefficient of friction and cause an imperceptible slip. I think it is probable the statement is true to which Mr. Barr called attention just after the paper was read, a law discovered by some German engineer, that an engine has an imperceptible slip at very high rates of speed. I was inclined to doubt it, but looking into the matter further, I think it is probable that there is an imperceptible slip at a very high rate of speed, owing to the effect of the counter-balance of the driving wheels.

Mr. LEWIS: Mr. Herr, I would like to have you explain the case of engine No. 150, as shown in fig. 1, where the dotted lines show the location of the flat spot and the depth of it when the engine was counter-balanced to almost the full extent of the reciprocating weights, and the flat spots shown in full lines occurred with the entire reciprocating weights removed and nothing but revolving balance in the wheel.

Mr. HERR: The spots are not entirely due to the counter-balance. I should say that in the case mentioned the worst spot was produced by what I call the first case of slipping; that is, when an engine is pulling

hard and the engineer is watching it carefully and it slips just a little, stops and slips again, the engine moving so slowly that the amount of counter-balance has no effect. What I call the second case of slipping is when the wheels "let go" entirely and spin with considerable velocity; then the centrifugal force of the counter-balance produces a variable pressure on the rail and causes a variable wear.

Mr. LEWIS: If it is so, might it not be that the entire development of flat spots is due to the slipping and not to the counter-balance? My investigation has led me to believe that this is the case. Now there is engine 40 (fig. 2) that was used in suburban service, where the speed developed by the engine was as high as it is on our main line trains, and yet you see that there is not a flat spot on the tire, while an engine on the same class exactly, with the same weight of counter-balance, flattens to the extent shown in Fig. 3 when in other service.

Mr. HERR: I think Mr. Lewis is entirely correct, and perhaps I have given an erroneous idea of my views in this matter by writing so much about the counter-balance. It was necessary, in order to determine the rotative effect and the forces in action to go quite thoroughly into the question of the counter-balance.

In reply to Mr. Forsyth's last question as to whether the proportion of reciprocating parts balanced, should be still further reduced, I should say that if the reciprocating parts can be reduced in weight any, I think the proportion of their weight balanced should be reduced; if they are made heavier, I do not believe it is policy to do so. I have handled engines when the proportion of the reciprocating parts balanced was less than the amount shown here, and some with more, without any very positive indication either one way or the other, but what indication I did get from this study led me to think that, with the present weights of reciprocating parts, this rule is nearly correct.

Mr. LEWIS: I would like to say one word in answer to Mr. Forsyth, about the extent of flat spots. We all know that a flat spot on a 33-in. car wheel, when of the length permitted in the interchange, rules 2 1/2 in., is only 1/4 of an inch in depth. Now, in these diagrams, we find that spots are from 1/2 to 1 1/4 of an inch in depth.

Mr. FORSYTH: How long is the spot, Mr. Lewis?

Mr. LEWIS: It is about 20 degrees of the circle.

Mr. FORSYTH: That is much more gradual than the slid-flat spot on a coach wheel.

Signaling Regulations on German Railroads.

The Minister of Public Works has issued a decree establishing a code of signaling regulations for the German railroads, to go into effect on Jan. 1 next, to supplant those dated Nov. 30, 1885. We give below such of these rules as are of interest to American and English readers, using the same numbers that are attached to the several paragraphs in the official publication.

II. *Hand.*—Signals of employees and target signals: (5) To "run slowly." The attendant by day extends any object toward the track; at night he exposes a green lantern to the train. (6) To signal a train to stop. The attendant by day swings any object in a circle; at night he swings a lantern in a circle, the light to be red, if possible. These signals may be given by means of target signals. (5a) To run slowly. The beginning and end of the section on which slow speed is to be maintained are marked by round targets on posts fixed at the right hand side of the track. The first target must be green with a white border, and must be marked A. The second target must be white and must be marked E. At night the beginning and end of the section are marked by lanterns on posts. The lantern nearest the approaching train must be green, the other one white. (6a) To stop a train by target, by day there should be rectangular post targets. The target should show a red surface with white border. At night there should be a fixed lantern showing a red light.

III. *Semaphore Signals.*—By day, the arm should stand out to the right, at right angles to the post, to signify stop. At night, a red light in the signal lantern. By day: To indicate a clear line, the arm, by day, should point upward to the right at an angle of about 45 deg. By night, a green light in the signal lantern.

Should it be desirable to make the position of the arm discernible from the rear, at night, the lantern should show a full, white light for the stop signal and a subdued white light for the all clear signal.

"Where it is considered necessary to indicate the switching off of trains from the main track, by signals on the same mast," the latter is provided with two or three arms, and the same number of lanterns placed one above the other. The lower arms and lanterns are used for the side tracks. When indicating the main line, the lower arms are placed vertically so as to be exactly in line with the post, and the lower lanterns show no light.

Lanterns which expose a red light, or show no light, to an approaching train, must show a full, white light, at the back; those that show a green light to an approaching train, must show a subdued white light at the back.

(11) To indicate all clear for a side track, the two upper arms point upward, to the right, at angles of about 45 deg., and by night green lights are shown in the two upper lanterns. Where there is a second side track, (12) All three arms point upward, to the right, at angles of about 45 deg. to indicate all clear for it, and at night green lights in the three lanterns.

The arrangement of signals on the same mast for trains running in opposite directions is permitted.

IV. *Advance Signals.*—Where it is considered necessary to indicate the position of a signal on a mast at some distance ahead, an advance (distant) signal in connection with and dependent upon the signal proper, is to be used. Such an advance signal should consist of a round target, capable of turning on its axis, and provided with a lantern. The signals to be given with it are: (13) When the (home) signal is at "stop" a round green target with a large white square in the centre is exposed to the approaching train; at night a green light is exposed to the train. (Full white light at rear of signal.)

(14) When (home) signal is all clear, target is placed either in horizontal plane or parallel to the track (invisible). By night a white light exposed to train. At rear the lantern shows a subdued white light.

V. *Signals on Water Cranes.*—The outrigger of the water crane is to carry a lantern at its end, in the dark, which shows red when the outrigger blocks the line.

ined, by day, a white, round target in front of engine, or on both sides of train; by night no signal is prescribed. To indicate that the section master should at once examine his section, (22) by day, a train hand swings his cap or any other article facing the section man; at night, a trainhand swings his lantern toward section man.

VIII. *Signals of Train Crew.*—With the steam whistle: (23) "Attention," a moderately long note. (24) "Apply brakes," (a) lightly, a short note; (b) hard, three short notes in quick succession. To Release Brakes.—(25) Two moderately long notes in quick succession. On special sections and at special stations, with the approval of the local authorities and the Government

explains itself and little description is necessary. It will be observed that the existing station, which appears at the extreme right of the cut, will remain of the same height as at present. The most novel feature of the completed building will be the arcade, extending over a portion of the sidewalk throughout the entire front and a part of the sides. At the extreme left of this arcade is a platform extending out to the curb line. This platform is on the track level and affords a convenient means of transferring baggage from the station to wagons without lifting it. As will have been seen from the drawings printed three weeks ago, the currents of arriving and departing passengers are entirely separated, the main exit being on the market street side. The east front has a large number of entrances. The principal entrance for the offices in the upper stories will be at the main entrance, corner of Broad and Market, and at the corner of Fifteenth and Filbert. Definite plans for the upper floors have not yet been made, but it is estimated that there will be about 200 offices, so as to ac-



NEW BROAD STREET STATION OF THE PENNSYLVANIA RAILROAD.

VI. *Switch Signals.*—Signals at switches must show by their shape, by day as well as at night, whether the main line is open, or to which side the train is to be sidetracked. Red and green signal lights are not to be used for switch signals, unless they are to combine in themselves the functions of stop and slow-speed signals.

VII. *Signals on Trains.*—(17) To indicate the front end of train: (a) When the train is on a single track road, or on its proper track of a double track road, by day, no particular signal; by night two white lanterns at front of engine. (b) When the train is not on the right track of a double track road, by day a red and white round target on front of engine; by night two red lights on front of engine. If, in exceptional cases, the locomotive is not at the front end of the train, or if the tender be in front of the locomotive, the above signals are to be shown at the front end of the leading vehicle. The rear of a train is to be indicated (18) by day by a red and white round target on rear end of last car at the height of the buffers, in the centre; by night by a red light on rear end of last car at about the height of the buffers, and in addition two lanterns on top of the last car showing green lights ahead, and red lights to the rear. Locomotives running alone on the road show a red light. Locomotives moving in stations have a white light both at their fronts and at the rear of tenders, and tank engines show a white light both forward and aft.

(19) To indicate that a special train is following, by day, in addition to previous signal, the last car is to carry at its top, at one side or both sides, a green target; by night, the same as signal 18, except that one of the two lanterns on top of last car should show a green light to rear as well as to front. Locomotives running alone should show a green light at the rear in addition to the red one as per signal 18. To indicate (20) that a special train is coming in the opposite direction, by day, a round, green target on front of engine; by night, a green light above the two white lights on front of engine.

To indicate (21) that the telegraph line is to be exam-

Railroad Commission, signals 21, 24 and 25 may be sounded by means of signal trumpets, except in cases of danger, in which the steam whistle must be used.

Signals with ordinary mouth whistle. (26) Train hands to go to their posts. A moderately long note. To start. (27) Two moderately long notes.

IX. *Switching Signals.*—Switching signals either with a mouth whistle or signal trumpet are to be given as follows: (28) ahead (29). One long note. To back (29). Two moderately long notes. To stop: (30) Three short notes in quick succession. Switching signals with the arm are to be given as follows: Go ahead (28 a), by day, vertical motion of arm downward; at night vertical motion of hand lantern downward. To back, (29 a) by day horizontal motion of arm from one side to the other; at night horizontal motion of hand lantern from one side to the other. To stop (30 a), by day circular movement of arm; at night circular movement of lantern.

General Rules.—The preceding rules for a train apply also to locomotives running alone, in so far as the latter are not subject to exceptions. Modifications in the manner of presenting the signals, are permissible, providing the working of the signaling rules is not against such modifications. This code of signals will apply to all the main lines of Germany, and to branch lines to the extent to which signals are used on them. Exceptions may be made under special conditions, subject to the approval of the local and the government railroad authorities. For railroads on the German frontiers, operated by other than German companies, departures from this code of signals may be permitted with the approval of the Government railroad authorities.

New Broad Street Station at Philadelphia.

We show in this issue a perspective view, reproduced from the architect's drawing, of the new passenger station of the Pennsylvania railroad at Broad street, Philadelphia, of which we published first and second floor plans in our issue of Sept. 30. The drawing fully

commodate all the officers and clerks now housed at Fourth and Walnut streets.

The trainshed, as heretofore stated, is 307 ft. x 707 ft., and will be 140 ft. high at the centre. The main arches have a clear span of 294 ft. and a clear height of 104½ ft. The structure will require 3,000 tons of iron, and there will be about 1½ acres of glass in the roof. The officers of the road, who have made careful comparisons, state that this trainshed will be the largest in the world, larger even than those of the Midland, the London, Chatham & Dover and others in London.

A Cave-in on the Furness Railway.

A subsidence of a remarkable character occurred on the Furness Railway on the 23d inst. As a heavy and powerful six-coupled goods engine was engaged in shunting operations in Lindal Bank, the driver noticed that the ground underneath him was giving way. His engine was traveling slowly. He reversed, shut off steam, and jumped off the foot plate just before the engine overturned, head first into a huge hole caused by the subsidence of the embankment. The tender broke loose at the couplings, but the engine was embedded, nothing but the foot plate and weather board being observable. Efforts were made to drag the locomotive up to the surface, and for this purpose a small incline was made; but before this was done the ground further subsided, and the engine descended out of sight to a depth, it is believed, of fully 100 ft. And there it remains buried to puzzle posterity. In the meantime, the original hole caused by the first subsidence increased in size, and practically stretched across the embankment, on which were eight lines of rails. Several of the roads collapsed, but the main line, which was carried on longitudinal sleepers, was suspended over the chasm caused by the subsidence. Only one road was left intact, and evidence of subsidence was observable even here.

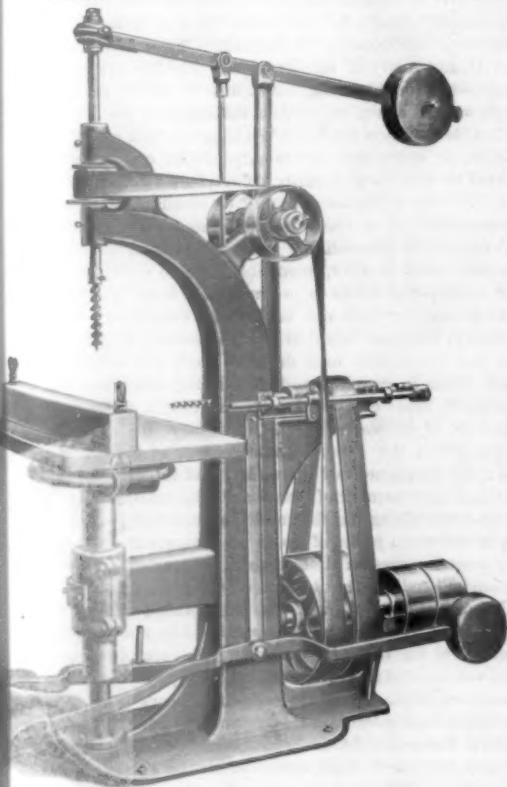
The railway at this point is undermined by the Parkside & Lindal Moor Mining Company, and for something like half a mile in length it is honeycombed by mines. For some time past evidence of the mine falling in, at any rate in its upper workings, has been seen, and on both sides of the railway embankment the ground has been gradually slipping for some time. The railway company, however, has been watching the action of this subsidence, and has placed a special watchman on the spot, with a view of detecting any change. Some time

ago an adjoining farmhouse was let in, and the company found it necessary to prop up a railway bridge to prevent the line from collapsing. It is reported, however, that the workings of the Parkside mines have not been interfered with by the subsidence in the embankment, and that they exist intact under a stratification of rock which is as yet unshaken. The inference is that the vast volume of water which is pumped from the mines has caused percolation through the rock, and left cavities in the upper strata which have caused a subsidence; but there is reason to believe that the subsidence which has now occurred is due mainly to the absolute fall of earth into old workings, and the fear is entertained that what has occurred at this part of the embankment may be repeated in other places.—*The Engineer*.

A Vertical and Horizontal Boring Machine.

The accompanying illustration shows one of a new line of boring machines manufactured by the John A. White Co., of Dover, N. H., which are neat and compact in appearance and are designed to meet the demands of the best class of woodworking establishments. The combined horizontal and vertical boring machine has the features of the light vertical and horizontal machines made by the same company, and will be found a convenient and compact tool for general shop use.

The frame is cast in one piece, and is so designed as to combine great rigidity with convenient access to every working part and absence of unnecessary weight. A special feature is in bringing the centre line of support for the table directly under the line of thrust of the vertical bit, thus obtaining entire freedom from cross strains.



Combined Vertical and Horizontal Boring Machine.

All shafts are of steel, with babbit lined boxes, except the arbors, which run in bronze bushings. The vertical and horizontal arbors have a longitudinal motion of 9 in. and 8 in., respectively, while the table has a vertical range in adjustment of 10 in. Both arbors are counterbalanced by weighted levers for withdrawing the bit after being fed into the stock by the treadles shown in the cut.

Like other machinery manufactured by the John A. White Co., they are built on the interchangeable plan, every part being made to gauge and numbered.

Settlement of a Bank on the New York, New Haven & Hartford.

The following account of a serious settlement of a bank on the New York, New Haven & Hartford is just received from Mr. F. S. Curtis, Chief Engineer of the road.

The embankment on the New London Division, across Lake Saltonstall, about six miles from New Haven, was originally a single track embankment, crossing the lake near its outlet, the top of the bank being about 15 ft. above the general average of the surface of the water in the lake. About 10 or 12 years ago the company enlarged the culvert under the embankment by replacing it with a brick arch 10 ft. wide, built on piles, which is near the west end of the embankment. This is still intact and there is no sign of its being injured.

Last spring the railroad company commenced widening the embankment for the second track, on the opposite side from the main portion of the lake. This was completed about July 1, although since that time the embankment for the additional track has settled down

at different times in all 4 or 5 ft., until, as we supposed, it had reached the solid foundation.

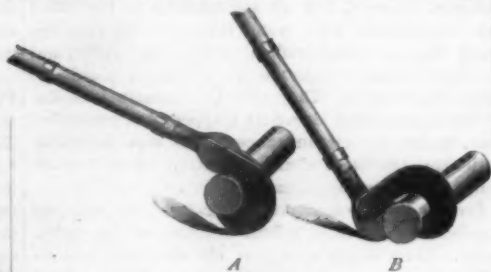
Last Thursday, Oct. 13, it was noticed that the embankment for the new track, which has not yet been put in service, had settled a few inches and that there were signs of its separating from the old embankment, there showing at the same time a small opening or crack between the two tracks. When this was noticed it was not considered of any very great account, but late in the evening the old embankment began to settle, and kept doing so until about 11 p. m., when it had settled about 15 ft. in all, taking the old track with it and more or less of the embankment for the new track, and what was left was some 4 ft. below the original level, and leaving the new track lying over on the edge of the slope, which of course stopped all travel. This new track was then moved to the south as far as possible and filling put in during the next day, when it was repaired sufficient to allow it to be used for trains, but of course at a very low rate of speed, as each time a train went over it, it settled more or less, and is still doing so, although we are putting in each day about 150 carloads of sand and gravel, or nearly 1,500 cubic yards.

The probability is that the hard bottom slopes very steeply toward the main body of the lake, and, in addition, when the original fill was made, more or less brush or loose filling was put in under the bottom of the embankment, and the new filling pressing against it on one side and the water in the lake being some 4 or 5 ft. lower than usual, caused the difficulty, that is, the bottom sliding into the lake. Still, there is something strange that the whole of the embankment did not go out into the lake, instead of the bottom portion letting the track down 15 ft. and leaving it only a few inches out of line. The length of the whole settlement was about 400 ft., being from the arch to the east side of the lake.

It is difficult to tell how long it will take or how much material to refill the gap, but from appearances I have an idea that a very few days, with the amount of material we are putting in daily, will do it.

The Q & C Car Mover.

The illustration shows a new and simple car starter, which is now being put on the market by the Q & C Company. A shows its position on the axle to push the car from the operator and B shows its position to draw



the car toward the operator. The device weighs about 30 lbs. It is easily applied to the axle and will start a loaded car with small exertion. It is self-adjustable to any axle, has an instantaneous grip and release and can be worked between cars to open up the train, and the car can be moved in either direction without change of position of the operator. The grip on the axle is obtained by a sharp pull on the handle, and with a little practice the operator is enabled to take advantage of the momentum gained and keep the car moving at a good speed. It is said that one man can move a loaded car quite readily. This device has been quite thoroughly tested on the Pacific coast, and some strong testimonials are on file in the office of the company who offer to send one for 10 days' trial, only asking that parties ordering it shall pay the freight charges.

The Denver & Rio Grande Strike.

President Jeffery has issued under date of Oct. 18 a circular giving a short history of the strike of trainmen on the Second Division of that road which began Oct. 15. It ended the 18th, when the men went to work, pending an inquiry. This was after the President's order was issued discharging peremptorily all men who did not go to work that day. The circular tells the story of a flagrant case of high-handed unionism, and therefore we reproduce its main parts:

On August 22, 1892, the following order regarding fast trains Nos. 61 and 64 was bulletined by the Division Superintendent, Mr. R. M. Ridgway:

Bulletin, No. 23.
"Train and enginemen on trains 61 and 64 must not detain their trains to get meals at Malta or Glenwood. On leaving terminals you must go prepared to go through, as these trains must make time."

This was bulletined for the information of employees at the terminals of runs on the division. On Aug. 24, two days after the issuance of the bulletin order, Engineer William Gordon was listed to take westbound California fast freight train No. 61 from Minturn to Grand Junction. As the train was ready to leave Minturn, Engineer Gordon called the Trainmaster, who was in Minturn, upon his engine and informed him that unless bulletin order No. 23, relating to detentions of trains 61 and 64 at Malta and Glenwood by train and enginemen taking meals, was recalled, he would not leave Minturn with the train. He used violent language, and stated he "did not care a damn if he never worked another minute." He would not go out until the order was recalled, and told the Trainmaster to go to the office and repeat this to division headquarters. This the Train-

master did at once. In order to avoid contention and disarrangement of the train service, the Division Superintendent, on being advised by telegraph of the situation, directed the Trainmaster to remove the order from the bulletin board, and train No. 61 was then taken out by Engineer William Gordon.

An investigation into the action of Mr. Gordon was ordered by the General Superintendent, and was held at Salida at 10:30 a. m., October 3d, at which were present the following persons, constituting the Board of Investigation: R. M. Ridgway, Division Superintendent, Chairman; A. W. Jones, Division Master Mechanic; J. E. Barnes, Traveling Engineer; G. H. Barnes, Trainmaster; I. G. Baker, Locomotive Engineer (selected by Mr. Gordon).

[A verbatim transcript of the proceedings of the investigating board follows, but we give only the results.]

Findings.—Engineer Gordon acknowledges having used the language in his conversation with Mr. Barnes at Minturn, as reported, and that he refused to obey the bulletin order or go out until it was recalled.

A copy of the proceedings of the Board of Investigation was forwarded to the General Superintendent on Oct. 4, with the following letter of transmission, signed by Mr. R. M. Ridgway, Superintendent of Division, and Mr. A. W. Jones, Master Mechanic:

"You will note that Engineer Gordon acknowledges having used the language as reported by Trainmaster Barnes, also that he refused to obey the bulletin order or go out on train 61 of Aug. 24 until it was recalled. This is a case that merits dismissal from the service, and we would recommend that it be done."

The General Superintendent in considering the matter gave weight to the previous record of Engineer Gordon, and in consideration thereof overruled the recommendation of the Division Superintendent and Master Mechanic, and directed that Engineer Gordon be suspended for 30 days. In conformity with the order of the General Superintendent, Engineer William Gordon was notified of the decision, his suspension taking effect from Oct. 2, the day he was taken from his run pending investigation and decision.

The care taken to obtain all the facts, and in a calm and judicial spirit take action in the case, is illustrated by the deliberation and patience shown in the action of the officers as above outlined.

The case was taken up by the employees of the Second Division, and apparently secret meetings were held, and at 2:10 o'clock on the morning of Saturday, Oct. 15, the following message was received by General Superintendent Sample, at his residence in Denver:

MINTURN, Colo., Oct. 14, 1892.

Mr. N. W. Sample, General Superintendent D. & R. G., Denver.

By action of employees taken at a union meeting at Minturn, Oct. 7, we as a committee hereby request the reinstatement of Engineer William Gordon and full time from the date of his suspension. This matter to be made known by a bulletin being posted at Salida, Leadville, Minturn and Grand Junction. This bulletin to be conspicuously posted by 7 o'clock a. m., Oct. 15, and unless such bulletin is posted by such time, we as the engineers, conductors, firemen and brakemen positively refuse to handle trains on Second Division after 7 o'clock a. m., Oct. 15.

By order of the COMMITTEE.

In accordance with the threat expressed in the telegram the engineers, conductors, firemen and brakemen of the second division, which extends from Salida to Grand Junction, abandoned and refused to take out their trains at seven o'clock in the morning of the same day (Oct. 15, 1892), and no trains have moved over the division since that time.

The notification received by the General Superintendent, at 2:10 a. m., Oct. 15, five hours before that portion of the line was tied up, was the first information, or even intimation, received by the company of the contemplated strike. Believing that friendly conferences between employer and employees for the purpose of adjusting differences are desirable, and that to avert a strike, disastrous alike to the company and the men, and in its effects greatly injurious to the public, arbitration in this case might be resorted to, the following telegram was sent at 5:10 p. m. to the Division Superintendent:

I shall be glad to confer with any committee of our employees for the adjustment of any grievances, and, if we cannot agree, am willing to arbitrate matters of difference; in the meantime, the men should return to and remain at work pending the adjustment, either by conference or arbitration. The company has always treated its employees liberally and justly, and the present strike, almost without notice, will not be sustained by railway employees generally, or the public. Give a copy of this message to the committee.

(Signed) N. W. SAMPLE.

To this the following reply was received by the Division Superintendent:

We, the employees of Second and Third Divisions, instruct our committee to inform you that we will not accept Mr. Sample's terms, and that we will remain out until a settlement is made amicable to ourselves.

From the foregoing, it will be seen that even arbitration, for which so many labor organizations have contended, is refused by the men through their duly appointed committee.

Interlocking in Illinois.

We have received a copy of the rules governing the uses of interlocking devices in Illinois, as adopted by the Railroad and Warehouse Commission, and the statutory provisions. By an act of 1887 trains may pass grade crossings or drawbridges without stopping, provided those places are protected by interlocked signals approved by the Commissioners. By an act of 1891, the Board of Commissioners may order a grade crossing protected by interlocked signals upon the petition of any railroad company using the crossing; or upon other petitions or information, and may apportion the cost of installing and operating the plant among the railroads interested. The Consulting Engineer of the Commission, Mr. Charles Hansel, has arranged the rules and requirements which were adopted Sept. 14 and which appear in this pamphlet. A copy can be had by addressing the Secretary of the Railroad and Warehouse Commission, Mr. J. H. Paddock, Springfield, Ill. The rules strike us as being generally good. Semaphore signals are required for uniformity. Derailers are required and facing point locks and detector bars. Preliminary locking is also specified. On the whole, the rules make a compact and very instructive little treatise on interlocking.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

We give in another column the German Government regulations for fixed and hand signals on railroads. They will strike most of our readers as a bundle of inconsistencies; some of the methods seem to provide for positively misleading signals. Indeed, they go far to confirm that view of an eminent American railroad official and engineer of German birth that we can learn nothing from the Germans about railroad operation. At the same time these extracts from the German code are not devoid of instructive hints. The fact that a subdued white light can be used to give an indication different from that given by a plain white light is worth more attention than it receives. The difference between the two lights is known, for ground glass has been used here; perhaps by expecting too much of it we have decided against it too hastily. It will be seen that the Germans use green for all-clear in semaphores. Possibly their inconsistent use of it in other signals may be such as to destroy any argument we might draw from this for the use of green for all-clear in this country, but we may note that this code also gives us a hint how to make a distant signal distinguishable from a home. The rule requiring two semaphore signals to be cleared at the same time seems, from our standpoint, to be about the clumsiest arrangement in this German code. The most profitable use we can make of this information would be to try the system of giving switching signals by mouth whistles. These are perfectly adapted to most of the work required in switching and in many circumstances they would be sufficiently loud to call in a flagman. They ought to be used in place of the steam whistle wherever possible, for the latter is an intolerable nuisance. Its use ought to be largely curtailed for the simple reason laid down in many codes—that its frequent use impairs its efficiency as a danger signal.

The evils due to the extensive use of private owners' cars in freight service are the subject of a communication from a correspondent in Chicago, which we print in another column. People will be somewhat suspicious of any movement of this kind by the Grand Trunk, for that is a road which has heretofore shown a disposition to get dressed beef traffic at any cost short of an actual loss on its carriage. As the payment of high mileage to shippers who ship in their own cars is a convenient way of reducing the freight rate, and as reductions have been common on the Grand Trunk, some further action than that now announced will be necessary to convince people that the abuse is likely soon to be corrected, on refrigerators at least. As to our correspondent's general appeal there can be only one opinion among fair-minded men. A railroad manager who pays enough mileage in 20 months to buy the car he is thus hiring, and who keeps the car in good repair all that time, is not open to argument, but the damage to his own reputation ought to make him solicitous, at least. He can take his choice of being thought one who pays favorites prices, which he knows are exorbitant,

or one who does not know any better than to throw away money. Moreover, as a part of these large mileage payments is generally supposed to reach the shipper's pocket in most cases, the manager can look upon himself as a law-breaker as well. The reform in charging for cars interchanged between the railroads, which everyone knows to be needed, would tend powerfully to root out this evil at the same time. But that reform seems to be stuck in the mire even worse than this. If the present discouraging state of things continues, people will begin to hope for the immediate success of the man who wishes to pool all the house cars in the country. He may not succeed in establishing a new system of payment, but the adoption of his scheme would expose the evils of the mileage system in a stronger light.

The Interstate Commerce Commission versus the Texas & Pacific.

As far back as March, 1889, the Interstate Commerce Commission made a general order requiring that imported goods transported to any place in the United States from a port of entry or place of reception, whether in this country or in an adjacent foreign country, should be taken on the inland tariff covering other freight. This order was not made upon formal complaint or directed against any particular carrier. It was deemed by the Commission within its general powers to issue such an order, and to see to its enforcement.

Of the 29 or 30 carriers whom this order affected more or less materially, upward of 13 appear to have conformed to it. The New York Board of Trade and Transportation, about the close of 1889, filed its complaint with the Commission, alleging that the Pennsylvania and other roads were not complying with the order of the Commission, and praying that the recalcitrant carriers be specially required to do so. The companies referred to were accordingly required by the Commission to show cause why such special order should not be entered against them. To this they gave different answers, but all substantially to the effect that competition with water transportation required lower rates on foreign traffic than on inland traffic, and the carriers had to make the discrimination in order to retain the business. They therefore admitted the discrimination against domestic shippers, but contended that, under the circumstances, this was justifiable under the Interstate Commerce Act, which forbade simply undue or unreasonable discrimination.

Perhaps the case against the Texas & Pacific furnished the clearest and most salient features of the controversy. There it appeared that the discrimination occurred in through bills of lading from Liverpool and London to San Francisco by way of New Orleans. The rates charged by this company under such bills from New Orleans to El Paso were but about one-half what domestic shippers were charged on the same freight for the same distance. The company showed that unless these concessions were made to the foreign shippers this traffic would be diverted from the American railroads and go to the Pacific coast, either around Cape Horn, all the way by water, or by way of Panama. It also appeared that while this traffic was not large, it was profitable, and well worth the effort of the carriers to get it and keep it.

There was a refreshing absence of dispute as to the facts, and the bare question the Commission had before it was whether the carriers were justified in making the discrimination for the purpose of keeping the traffic, or, in other words, whether the discrimination was reasonable or unreasonable.

We are so familiar with the doctrine of protecting our citizens as against the world that it must have appeared a little quizzical to the Commission to hear argument on the proposition of the carriers to establish a tariff in favor of foreigners at the expense of American shippers. There was evidently too much novelty about this idea for the Commissioners, for they were unanimously of the opinion that such discrimination was unreasonable and contrary to the law.

The offending carriers were accordingly required to establish the same rate for foreign and for domestic shipments. This, the Texas & Pacific, with others, refused to do. The Commission then made an application under the act to the Circuit Court of the United States in New York, to enforce the order mentioned, and the decision of the Court, Judge Wallace presiding, has just been rendered, whereby he concurs with the Commission in its conclusion that the discrimination is unjust; and he grants an order requiring the delinquent carriers to comply with the mandate of the Commission.

It will thus be seen that the gist of the decision is that a carrier cannot justify a discrimination in

rates solely, or even mainly, on the ground that otherwise he would lose profitable business. Such a consideration cuts very little figure in the matter, though it is worthy of attention and has its place. The interest of the carrier is not to be overlooked or disregarded. He is to be treated justly and fairly. And where he shows, for example, that he discriminates because of the difference in cost, or character, of the service, or in consideration of guarantees of large quantities and full loads at regular intervals, or for other such reasons, his proceeding is lawful and will be upheld. Such discrimination is not unreasonable or undue, within the meaning of the act.

The case is valuable, not only for what it decides, but also for what it implies. It is a clear implication from the decision that the orders of the Commission in such matters are constitutional in their nature, and result from proceedings in which the rights of the carrier are duly guarded and in which he is given ample opportunity to set forth his case. It recognizes the power and authority of the Commission in controversies of the character under view, and blazes the way to yet further elucidation of an act which doubtless for years to come will be the subject of controverted interpretation and authority.

Do Big Excursions Pay?

We give in another column a preliminary of the extraordinary passenger movement to and from Washington on the occasion of the recent Encampment of the Grand Army of the Republic. The two principal roads—both double track, trunk lines—were for several days worked about up to their full capacity for a considerable distance out from Washington, and at other places, as well; and future possibilities can be estimated by what was actually accomplished here. But with all the statistics that will be available we shall be compelled to use the word "estimate." Any precise calculation of possibilities, and especially of cost, is, for any other locality, impossible. There were peculiar and special limits to prompt movement of trains which may or may not be present elsewhere. For instance, the mere fact that a large amount of switching had to be done in a crowded yard, and that the time taken in coupling and uncoupling cars was thus increased, alone delayed the car movement seriously. Placing of employés in positions they are not familiar with; the general management of the discipline; the assignment of extra men and the decision as to the proper number of these are also vital elements in an undertaking like this, and these are things which no outsider can judge of, so as to compare them with the same features on another road, without making an extensive study of the question on the ground.

In spite of these elements of uncertainty, however, the subject is an attractive one, for, like many transactions in the freight department, this excursion business was carried at rates which left a pretty narrow margin of profit, and many railroad officers are questioning whether the net results on the Pennsylvania and the Baltimore & Ohio were sufficient to justify an equally low tariff—half rates—on similar occasions in the future. Officers of the Union Pacific say that they lost money on the recent Denver excursion (not, as we understand it, directly, but by the disturbance of freight business). The other roads participating in that business doubtless found themselves obliged to magnify the advantages in the way of advertising the road and to minimize the indirect losses all they dared to in order to figure out a profit. Those interested will recall other cases where a large volume of excursion traffic carried at a cent a mile or over (which is much higher than was got out of the Denver business) has affected the net earnings of the month in a ridiculously small degree as compared with the risk and disturbance involved. A road with a large freight traffic may lose more by reducing fare one-half than another would by taking off four-fifths.

The advantages from a large excursion are summed up in a word. Passengers can be carried in train loads and a rate which seems very low to them is therefore quite profitable to the railroad. When large numbers of people are drawn to one place they can be secured by legitimate methods and the payment of excessive commissions on ticket sales avoided. This enhances the advantage just named, but to go further than this we must deal with uncertain factors. The disadvantages or outgoes are numerous. Delays of freight shipments cause disturbances which may do harm for weeks, and cause a real, though concealed, money loss. Putting freight men on passenger runs involves much extra pay for idle time. The section men cannot do much on the track and that is so much direct loss. They can be made available as signalmen and supernumeraries, but the track work, if there

is any to do, is actually put back. At this time of the year, however, this loss is at the minimum, as important maintenance work has been finished for the season, or should be nearly so. Excursions running through several days generally involve considerable empty car mileage, which tends to neutralize the advantage of full train loads. In some respects the extra strain on the train and station men is the worst of all the disadvantages. The superintendent very likely feels this more than any of the others, as the tension on the subordinates' nerves is, as it were, concentrated to produce anxiety to his mind. Finally, the advantage supposed to accrue from advertising the road may be largely impaired by the feelings that several hours' irksome delay will produce in a passenger's mind, especially if he hears a report, true or otherwise, that rival lines made better time.

All these elements are present in an exceptionally large excursion like those above spoken of, but even a single excursion—that is, a round trip of one or two trains made in one or two days—is held by many to introduce unusual elements of danger, and reports of collisions of special trains, caused by circumstances that would not have affected a regular train, often seem to justify this view. This being so, we have one large disadvantage which, with many officers, outweighs all the others. That is, the possibility of disaster to life and limb, in spite of all the precaution and anxiety, is always present and may be serious. We will not stop to discuss this point now, but it is proper to say that the larger the road and the more fully it follows rational methods in its ordinary operations, the smaller this danger. With a proper block system, strictly managed, irregular trains are as safe from collision as the regulars. Where a road is sufficiently equipped with fixed signals, and engineers are made to obey them, the rule-of-thumb methods that produce these collisions which are attributed to the difference between a regular and an extra train, are killed out.

This aspect of the accident question should be clear to every one. A point that is not so clear, however, is that concerning the apportionment of the cost. If an excursion netting \$5,000 is attended by a collision costing \$5,000, should the venture be classed as a total failure or should the \$5,000 loss be charged against the passenger traffic of the year? We shall not attempt to answer the question offhand and, indeed, it cannot be answered once for all.

As long as railroad managers are human, and as long as human beings shrink from such great strains as are put upon a manager's mind by the work we have been discussing, we may expect railroad officers to decide that mammoth excursions, resulting in very small profit, ought to be discouraged; and where there are decided indications that the final result, on passengers and freight together, will magnify those inclinations, and justly, it is very natural to wish that the traffic department would raise fares a little instead of reducing them. A railroad president who visited France this summer noticed day excursions there on which the fares were higher than the usual rates. Whether this was because the regular rates were unremunerative or because it was impossible to operate the road so as to take all the business offering, we do not know, but it is certainly a pertinent question whether, on an occasion like that at Washington, the traffic could not be spread over a longer time, and thus made more manageable, by limiting the going tickets to expire one, two or three days before the commencement of the meeting or celebration, the time being fixed according to the cheapness of the ticket.

The principal weakness in this theory of the managers is that railroads are run for the benefit of the public, that the public in this country is not satisfied with any conclave, encampment or national gathering of any kind unless it eclipses all previous occasions, and that therefore every one wants the railroads to supply themselves with enough cars, engines and station facilities to be able, on any occasion, to run a continuous train of passenger cars for days at a time over 1,000 miles. America beats the world in the amount of its railroad track, and people think that it can just as well take the lead in handling large volumes of passenger traffic. And as long as people are at least partially willing to pay for such service, probably a good deal of it will have to be done for some time to come. Railroad managers themselves would like to get more accurate knowledge on some points concerning the maximum capacity of roads under certain conditions, and those who are young and ambitious will doubtless be glad to make further trials. When making experiments for future guidance it is often deemed right to sacrifice present profit.

They will make the trial if the public demands it. There is one little doubt on the point, however. The one widespread complaint at Washington was of long

delays. Day cars packed with passengers were 8 or 10 hours late and were kept on the road all night. If passenger trains are to be run as we run freights, that is, make each train suffer for the delays of a dozen trains ahead of it, common fairness requires that ticket buyers be told the fact. Perhaps then they would ask for higher prices and better service. It is wholly out of the question, of course, to carry from six to thirty times the usual number of passengers and carry them anywhere near on time, if the journey is a long one, and the conditions might as well be acknowledged. The Manhattan Elevated Road in New York can carry a million passengers a day, but no ordinary road can think of doing such work without the Manhattan's conditions and years of practice.

September Accidents.

Our record of train accidents in September given in this number, includes 113 collisions, 84 derailments and 6 other accidents, a total of 203 accidents, in which 93 persons were killed and 235 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But- Crossing ting, and other.	Totl.
Trains breaking in two.....	8	1	9
Misplaced switch.....	5	4	10
Failure to give or observe signal.....	6	2	12
Mistake in giving or understand- ing orders.....	5	5	10
Miscellaneous.....	9	8	17
Unexplained.....	15	17	32
Total.....	43	36	79
DERAILMENTS:			
Broken rail.....	3	Bad loading.....	1
Loose or spread rail.....	3	Derailing switch.....	1
Defective bridge.....	1	Too sudden application of brakes.....	1
Defective frog.....	1	Open draw.....	1
Bad track.....	2	Animals on track.....	2
Broken wheel.....	3	Landslide.....	1
Broken axle.....	3	Washout.....	1
Broken truck.....	3	Malicious obstruction.....	1
Broken car.....	2	Accidental obstruction.....	2
Loose wheel.....	1	Maliciously misplaced switch.....	1
Misplaced switch.....	9	Unexplained.....	33
Unfastened switch.....	2		
Careless running.....	1		
Track repairs.....	1		
OTHER ACCIDENTS:			
Boiler explosion.....			1
Cars burned while running.....			3
Various breakages of rolling stock.....			1
Other causes.....			6
Total number of accidents.....			203

A general classification shows:

Col- lisions.	Derail- ments.	Other accidents.	Total.	P.c.
Defects of road.....	19	4	23	11
Defects of equipment.....	9	4	13	6
Negligence in operating.....	51	2	53	26
Unforeseen obstructions.....	9	9	18	9
Unexplained.....	33	33	66	33
Total.....	113	84	197	100

The number of trains involved is as follows:

Col- lisions.	Derail- ments.	Other accidents.	Total.
Passenger.....	46	25	71
Freight and other.....	161	60	221
Total.....	207	85	292

The casualties may be divided as follows:

Col- lisions.	Derail- ments.	Other accidents.	Total.
KILLED:			
Employees.....	44	21	65
Passengers.....	15	6	21
Others.....	3	1	4
Total.....	61	28	89
INJURED:			
Employees.....	75	25	100
Passengers.....	63	56	119
Others.....	4	2	6
Total.....	142	83	225

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road.....	3	19	3
Defects of equipment.....	9	7	5
Negligence in operating.....	15	65	40
Unforeseen obstructions and malfeasance.....	9	21	8
Unexplained.....	33	7	3
Total.....	69	112	59

Forty-one accidents caused the death of one or more persons each, and 46 caused injury but not death, leaving 116 (56 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with September of the previous five years shows:

	1892.	1891.	1890.	1889.	1888.	1887.
Collisions.....	113	130	124	71	66	83
Derailments.....	84	92	120	30	57	63
Other accidents.....	6	6	10	2	3	4
Total.....	203	228	254	103	126	150
Employees killed.....	65	54	75	36	29	52
Passengers killed.....	21	11	34	20	17	9
Others killed.....	3	5	17	7	6	3
Employees injured.....	110	93	164	77	65	131
Passenger trains involved.....	74	75	87	51	42	66

Average per day:

	6.77	7.90	8.47	4.40	4.20	5.00
Accidents.....						
Killed.....	3.10	2.16	4.23	1.53	1.10	2.03
Injured.....	7.83	6.09	11.36	5.40	7.40	6.37

Average per accident:

	0.435	0.232	0.500	0.348	0.360	0.407
Killed.....						
Injured.....	1.157	0.770	1.330	1.227	0.742	1.237

The month of September was marked by an unusual

number of serious and startling accidents, passengers being killed at nine different places. Twenty-one persons were killed on one day, the 21st, the accidents at Shreve, O., and Osage, Kan., having occurred at about the same hour on that day, and there having been three others which resulted in one or more fatalities each. The total number of passengers killed during the month was 21. The three most notable accidents were those at West Cambridge, Mass., Shreve, O. and Osage, Kan. The rear collision at New Hampton, Ia., on the 24th and the butting collision at Eckenrode's Mills, Pa., on the 8th, killed 15 persons, though nearly all of them were employes. The passengers killed at Lincoln, Ill., Marshalltown, Ia., and St. Johnsville, N. Y., were in cabooses.

The Board of Railroad Commissioners of the State of Massachusetts rendered a decision on the 13th in the case of the Fitchburg accident at West Cambridge on Sept. 10. The Board placed the entire responsibility for the accident on H. P. Goodwin, the engineer of the freight train which ran into the rear of the passenger train. It finds that he ran past signals that were set against him, and, although the night was foggy, he was running at an "unusual and excessive" speed; a faster rate in fact than the schedule called for, and that at no time did he call for brakes. The Board finds that the company had begun in August last a siding 1,500 ft. long which is designed to form part of the second track, and that four days before the accident the President was authorized by the Board of Directors to proceed with double tracking the entire branch. In view of all these facts the Board cannot censure the company or any employee except Goodwin.

A derailment at Cincinnati on the 13th furnishes a striking illustration of the peculiar conditions connected with the use of air brakes on freight trains. This subject was discussed in the *Railroad Gazette* of Oct. 7. A number of accidents furnish striking morals which are readily seen on the surface. In one collision on the 3d, and a derailment on the 4th, the engineer of the train at fault was accompanied by a pilot, the circumstances suggesting the query whether a man feels his responsibility any more with his hand on the throttle than when he controls the train by first communicating his wishes to another person? A rear collision on the 11th seems to be wholly or partly due to the accidental extinguishment of a light in a red lantern. Near Boston, on the 13th, a collision was occasioned, but not caused, by the automatic application of the air brake in consequence of the rupture of a hose; and 20 cars were wrecked in a freight train collision under similar circumstances on the Lehigh Valley. The theory so popular about 1882, that it is dangerous to stop a train, will be revived if this kind of loose discipline continues to be shown up.

The butting collision at Monticello, Ill., on the 1st is said to have been due to the negligence of conductors and engineers in not thoroughly studying the new forms of train orders which had just been put in use on that road in connection with the adoption of the standard code.

We have noted in September three cases of hand cars being run over by trains, five men being killed and 13 injured. There were at least five serious accidents to, or in connection with, electric street cars; which, as in previous months, occurred in as many different cities. One of these, at St. Louis on the 13th, which is explained by the simple statement that "the motor man lost control of his car," resulted, according to the dispatches, in the death of 7 and the injury of 12 passengers.

A singularly aggravated instance of the folly of "organized labor" took place last week on the lines of the Atchison, Topeka & Santa Fe. An operator named Barker sent out a telegram signed by Mr. Ramsey, Chief of the Order of Railway Telegraphers, and declaring a strike of operators on the whole system. The result was that the day operators, having made the necessary arrangements to get trains to passing points, all struck, and the night operators also refused to go to work. For 12 hours the freight business of the road was completely tied up and 2,000 operators were idle. Passenger trains were kept moving by schedule, and it is said with very little delay. Mr. Robinson, Vice-President and General Manager, immediately endeavored to get into communication with Mr. Ramsey, but had some difficulty in doing so. He finally secured an order for the operators to return to work, and a statement from Mr. Ramsey that the order to go out was a forgery. The press dispatches added "Barker has been discharged." We should suppose so. But what a startling instance this is of the power for evil that is put into the hands of the individuals or little groups of individuals who rule those great organizations, and what a startling instance it is of the surrender on the part of the great bodies of men of their liberty of action. It is nonsense to talk about the tyranny of capital so long as employes are willing to subject themselves to the tyranny of trade unions. They apparently have the sort of treatment that they like.

We have received from the Concord & Montreal Railroad a copy of a circular issued under date of Sept. 30, designed to prevent the spread of disease through the medium of the buildings, cars or traffic of that railroad. The circular is designed for the instruction of officers and employes, and station agents are required to

keep copies of it posted in proper places. It provides for cleanliness and disinfection, but employes are warned that disinfectants must not be used as substitutes for soap and water and other means of cleanliness. The storage of substances liable to decomposition in passenger depots is forbidden. All places in stations and cars liable to special filth must be particularly watched, as must the water supply of each station. Persons knowing of unsanitary conditions at any station are asked to promptly notify the division superintendent. This is the only special order of the kind we have received recently from any of the railroad companies, and yet, we doubt not that many of them have taken similar action. If they have not, they ought to, for so they will help to raise the standard of cleanliness and to encourage proper precautions in the whole community, aside from the direct good which such precautions will do on their own lines; and whether or not cholera comes here next spring, the increased attention to sanitation will be a blessing to the country.

An attempt was made on the night of Oct. 17 to wreck a train just outside of Memphis, on the C. & O., by misplacing a switch. A special car on this train carried President Fish, Vice-President Welling, Second Vice-President Harahan and two directors of the Illinois Central. We congratulate these gentlemen on their escape from sudden death. The world is not ready to get along without their services yet. But we trust that this experience will give them a keener interest than they have ever felt before in that unspeakable scoundrel, the train-wrecker. There is an astonishing apathy among the general public, which seems to extend to railroad officers, with regard to this growing crime. It can be prevented almost absolutely, and probably it would not be very difficult to prevent it, but that end can be brought about only in one way; that is, by a thorough education and awakening of public opinion, so that state and municipal officers would be compelled to act vigorously in detecting and punishing these dreadful crimes, and by concerted action on the part of the railroad companies in offering rewards and employing detectives. In some of the states it would doubtless be desirable further to get additional legislation, although existing laws are doubtless ample in most of them.

We venture to say that when the figures are collected and published, showing the progress made by the M. C. B. coupler in the last year, most of the intelligent and reasonable advocates of a general law compelling the use of an automatic coupler will conclude that it is best to wait another year at least. For some time we have known that the Northern Pacific and the Great Northern are looking into the various M. C. B. couplers now on the market with the view of adopting one of them as standard. The "Nickel Plate" is also doing the same thing, and the latter line has taken up seriously the question of steam heating equipment for its passenger stock.

NEW PUBLICATIONS.

A Text Book on Retaining Walls and Masonry Dams. By Mansfield Merriman, Professor of Civil Engineering in Lehigh University. New York: John Wiley & Sons, 1892. Large 8vo, pp. 122.

This, like most of Professor Merriman's publications, is a book useful for the practitioner as well as for the student. For the student it is rudimentary and the matter is logically arranged, beginning with the simplest problems and working up to the most intricate of wall problems—that of the design of masonry dams for retaining water. The theory on which any formula set forth in the book is based is given simply and clearly. In a number of instances the author does not express any opinion of his own as to the soundness of the theory, but merely states that such-and-such opinions are entertained by those who have treated the subject, and if such theory is correct the method of investigation is as follows. This is a much better course to be pursued in a text book of this character than advocacy of any particular theory concerning which dispute or doubt may arise.

To the old practitioner, who has perhaps become a little rusty in his mathematics, but who has pretty clear ideas of what he wants, and has his own opinions as to how anything ought to be done, this book will be valuable as affording in concise form and clear language and intelligible formulae the means of designing the structure which he has in mind.

One objection which may be made to the book has been made in these columns to previous publications by the same author, and publisher, namely, that the answers to the problems at the end of each section are not given. That is all very well for the professor giving problems to his class, but for the casual user of a formula, it is much better that the correct answer to a problem which has been worked out by that formula should be given, so that he can know at once whether his understanding of it is correct.

In another small matter the book might be improved, that is by the insertion of headlines giving the diagrams to which formulae are applicable and the meaning of the notation on pages on which variations of the formulae are used. There is plenty of margin for this on the pages, and the additional cost of making the book would have been very slight.

The theory of masonry dams is very clearly given, and the concluding sentence of the book strikes one as very sensible: "The theory of a dam which is curved in plan and which acts more or less like an arch has not been considered here. It may be stated as the general consensus of opinion, that a section which resists water pressure by gravity alone, like those described in these pages, will not usually be rendered stronger by being curved in plan. A curve, however, is pleasing to the eye and impresses the observer with an idea of strength so that it is often advisable to employ it, even if the length of the dam be slightly increased."

Journal of the New England Water-Works Association, September, 1892—This issue of the *Journal* contains the report of the 11th Annual Convention with the papers presented. It can be had by addressing Mr. Walter H. Richards, New London, Conn. The price is 75 cents.

TRADE CATALOGUES.

Light Locomotives. H. K. Porter & Co., Pittsburgh, Pa. 7th edition. 1892.

As our readers know very well, this company makes an exclusive specialty of light locomotives in great variety of size and style and for any gauge of track. By the duplicate system of records, drawings, gauges, etc., each locomotive is made interchangeable with all others of the same size and class, reducing the cost of repairs to a minimum. With all locomotives lists of names of parts are furnished to save delays in ordering for repairs, and a stock of duplicate parts is always kept on hand so that an order can be filled immediately. From the records of the house it appears that 90 per cent. of



Compressed Air Mine Locomotive.

orders for supplies are filled from stock, 63 per cent. being shipped on the day of receipt of order and 27 per cent. the next day, because orders were received too near the close of business hours to ship the first day. This appears to be a remarkable fact and one which is doubtless considered by the old customers of the company in placing their orders. A considerable stock of completed locomotives of various types is kept on hand, and when any of these stock locomotives are sold another one is at once put under construction.

The catalogue before us does not give prices, but it does give descriptions, tables of dimensions and weights in large detail, and hauling capacities for a remarkable variety of engines. These include eight-wheel passenger engines, and engines of the same type with four drivers coupled and a single truck; also tank engines, light six-wheelers and moguls; double-enders, and so on. The mine locomotives illustrated are particularly interesting, and among these are compressed air engines, two views of which are shown in the cuts herewith. These are built with one, two or three air tanks. For outside service they are provided with a cab and shorter tank, reducing the total length by about one-third. The list shows these engines with cylinders from 5 x 10 in. up to 10 x 14 in. and from 8,000 lbs. to 24,000 lbs. on the drivers. The catalogue gives a short chapter on the construction and operation of these engines.

There is a good deal of other matter in the catalogue of considerable interest, such as tables and rules for computing hauling capacity on grades, remarks on the rails and permanent way of light railroads, a discussion of the equipment and operation of street and suburban railroads, etc. Finally, 81 pages are given up to actual records of work done by Porter locomotives taken from reports furnished by the users. These give particulars of sizes of cylinders, gauges, weights of rail, curves and grades and loads hauled.

The Wood Workers' Manual.—A Treatise upon the best Practical Methods of Constructing and Arranging Wood Working Plants, etc. By C. B. Tompkins, M. E., Dover, N. H. John A. White Company, 1892.

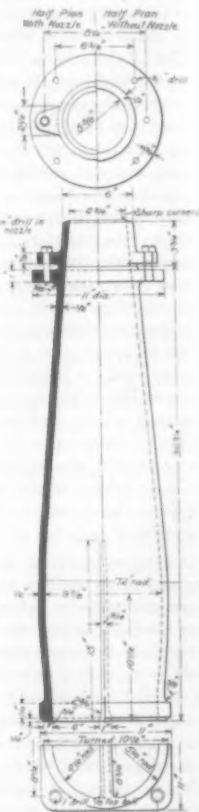
This is an octavo pamphlet of 60 pages, with a table of

contents and an alphabetical index, the scope of which is suggested by the title. The chapters cover the subjects of location, building, tool outfit, shafting and pulleys, fire protection, care of machinery and other topics. The fact that it is published as an advertisement, and that it contains a number of pictures of the machines built by the John A. White Co., does not make it any the less valuable for users of wood-working machinery.

The Drexel Railway Supply Co., The Rookery, Chicago, has issued a neat catalogue of the Drexel solid steel coupler which shows the construction of the coupler very clearly. This coupler is made throughout of a high quality of open hearth steel. It will be remembered that one of the important claims for this coupler is that by means of the unlocking device, which is intended to be worked from the side of the car, when the drawbar is pulled out suddenly under heavy strain the releasing gear operates to pull the lock up and open the knuckle.

Michigan Central Exhaust Pipe.

Our illustration shows the construction and dimensions of an exhaust pipe which has been in use for about three years on the Michigan Central Railroad, where it has given great satisfaction. It is used on the 19 x 24, ten-wheel engines in both passenger and freight service. The nozzle, as shown in the illustration, is 4 3/4 in. in diameter, but it has been



Michigan Central Exhaust Pipe.

reduced to 4 1/2 in. in diameter for some engines during the winter. The same style of exhaust is used on the Michigan Central compound engines, but on these the diameter of the exhaust tip has been enlarged to 5 1/2 in. and sometimes to 5 3/4 in. with good results in all respects. This is specially notable, as it will be remembered that in some cases it has not been found practicable to use as large nozzles on compound engines as on the corresponding single expansion locomotives.

Iron Production and Prices.

Our production of pig iron for the third quarter of this year has been, approximately, 2,100,000 gross tons. This is more than 100,000 tons less than the production in the third quarters of 1890 and 1891, but four or five hundred thousand tons more than the production in the third quarters of 1888 and 1889. It became evident when Mr. Swank published the production for the first half of this year, showing that for the year ending with June 30 last, our make had been 9,710,818 gross tons, that we were exceeding the consumptive power of the country and the capacity per week of the furnaces in blast, fell from 169,850 gross tons on July 1 to 156,584 tons on September 1, but though the price remained unprecedentedly low, the steady demand, which was in excess of the production, led to increasing the capacity of furnaces in blast, on the first of this month, to 161,558 gross tons.

As has often been before pointed out, we have become the great iron-producing and iron-consuming country of the world. We have about one-twentieth of the population, but we have consumed about one-third of the world's product for the past two years, our exports just about balancing our imports in value, so that our entire make virtually goes into the home consumption. About 20 years ago England was making about half of the world's production, and thought her position as the controlling factor in the iron market unassailable, but she is now struggling to hold the second place. This change may

be shown by comparing the productions of the three chief iron-making countries in 1872 and 1891:

	United States.	Great Britain.	Germany.
Prod'n.	Per ct.	Prod'n.	Per ct.
1872...	2,548,715	6,714,929	1,157,835
1891...	8,279,833	7,228,490	4,452,019
	23.7	62.7	13.6
	11.4	36.2	22.3

Or, in other words, while Great Britain has been increasing its production by 7.7 per cent. we have gained 225 per cent. and Germany 205 per cent. Accompanying this marked change in the situs of iron making, there has been a great decrease in the cost of pig iron to consumers. In 1872 the average cost of Scotch warrants for good mixed brands of pig iron was 101 shillings 10 pence, or \$24.844 and for 1891 the average price of warrants for the same quality of iron was 47 shillings 2 pence.

In this country the average price of No. 1 anthracite, our standard, was for 1872, \$48.875, and for 1891 it was \$17.52; or the American price has fallen to 35.5, while the English is 35.5, of the price in 1872. This means that while the American product of 1872 cost consumers \$124,508,347.88, that of 1891 cost but \$145,378,394.16, a gain to the producers of less than \$21,000,000, or 17 per cent. for doing 3½ times as much work. Our British competitors sold their make of 1872 for \$163,825,698.08, and only received \$83,185,331.97 in 1891, for 7.7 per cent. more iron. In other words, an American buying a ton of pig iron in 1891 saved \$31.35 from the price of twenty years before, and the Englishmen, under like circumstances, saved \$13.24.

TECHNICAL.

Manufacturing and Business.

The Ingersoll Milling Machine Co., of Rockford, Ill., has just shipped one of the largest slab milling machines ever built. The machine mills at one cut, 42 in. wide, and it weighs over 11 tons.

The Standard Cattle Guard Co., of Chicago, has received an order from the Richmond & Danville for one and one-half carloads of Standard cattle guards, and the company also has a large order from the Wisconsin Central.

The King Bridge Co., of Cleveland, O., has considerable bridge and structural work under contract, including a four-span bridge for the Chesapeake & Ohio at the First Greenbrier Crossing; a number of girder spans for the Lake Shore & Michigan Southern, the Baltimore & Ohio and the Chicago, Burlington & Quincy; two trestle bridges for the Cleveland, Lorain & Wheeling, each about 1,000 ft. in length; metal work for the new train shed for the Illinois Central at Chicago, and an extensive iron building for the Brown-Bonnell Iron Co., of Youngstown, O.

The Kellogg Oil, Paint & Varnish Co., of Buffalo, N. Y., who have been long known as manufacturers of linseed oil under the firm name of Kellogg & McDougall, have perfected an iron paint for bridges and other iron work which withstands atmospheric action. In their method of manufacture they have succeeded in making such a thorough incorporation of the metallic substances with the oil and driers that a homogeneous, impervious, coating is formed and corrosion or action from the under surface is prevented.

Henry R. Worthington has opened a new branch office at No. 1672 Larimer street, Denver, Col., and there will be carried at that point a full line of pumps, water meters and repair parts.

The Benjamin Atha & Illingworth Co., of Newark, N. J., have recently enlarged its steel foundry by adding to the buildings, and it has also put in a 20-ton electric crane and a number of tools for preparing castings for the market. The additions will about double the capacity of this department.

The Pintsch Compressing Co. has arranged for building Pintsch gas works at Portland, Or., and Oakland, Cal., to supply gas to the passenger cars of the Union Pacific and Southern Pacific as these roads will use the Pintsch system. Gas plants have already been erected at Council Bluffs, Omaha and Ogden to supply these roads and the Missouri Pacific.

The new shops of the Detroit Foundry Equipment Company at Michigan avenue, Detroit, are being worked to their full capacity, and the company reports a large number of orders for Whiting cupolas, ladles and cranes.

The Indiana Car and Foundry Works, of Indianapolis, is purchasing lumber and other material for the operation of its shops, much of which has already been delivered, and the company expects to commence building new cars in a short time. The works were formerly operated by the Indianapolis Car and Manufacturing Co.

The Thurmond Car Coupling Co. has leased all its appliances, including the coupler, and McKen tender hook and carry iron, to Isaac G. Johnson & Co., of Spuyten Duyvil, N. Y., manufacturers of steel and malleable iron. T. L. McKen has leased his continuous platform and buffer to the same firm and will have charge of the manufacture of the appliances. The office at 80 Broadway, New York, will be continued, with Mr. Hascall in charge, representing I. L. Johnson & Co.

Iron and Steel.

The Chester Steel Casting Co., of Chester, Pa., is building an addition to its foundry, which will be 50 x 50 ft. and a new furnace house 40 x 40 ft.

The Maryland Steel Co. has commenced to roll the 100-lb. rails ordered by the Pennsylvania some time ago. Special rolls had to be designed for the rails.

The Cleveland Steel Casting Co. proposes to erect shops

in Cleveland for the manufacture of iron and steel castings. Among those interested in the new concern are N. P. Bowler and William Balkwill, of Bowler & Co., founders, of Cleveland; J. V. Kennedy, C. B. Herig and C. A. Parsons.

The Eagle Furnace Co. is building a 75 ton furnace at Spring Valley, Wis., and will use ore from the mines of the Wisconsin Iron & Lumber Co. This ore is said to produce an excellent pig for car wheels and general foundry use.

New Stations and Shops.

The Canadian Pacific has had plans prepared for a new station at Montreal Junction, Que.

The new tender shop of the Mt. Clare works of the Baltimore & Ohio is completed and occupied by the workmen. The new shop has a capacity for the erection of 12 tenders at a time, double the capacity of the old shop. All shops of the Baltimore & Ohio are now working up to capacity and have sufficient work in sight to keep them going for several months. They now employ 6,000 men.

The Baltimore & Ohio has purchased land at Kearneysville, W. Va., and will erect a new passenger and freight station at that point.

The Chesapeake & Ohio have prepared specifications for a new combination passenger and freight station at Central City, Cabell County, W. Va.

The new shops of the New York, Susquehanna & Western at North Paterson, N. J., are completed and will be in operation within two weeks. The shops are fitted with the best modern machinery and will give employment to about 150 men, most of whom will be transferred from the temporary shops fitted up since the fire at Wortendyke.

The large new shops of the Alabama Great Southern at Meridian, Miss., will probably be completed and occupied by the workmen before Dec. 1.

Mr. Geo. W. Miller, President of the Buffalo Car Manufacturing Co., has purchased several acres of land situated east of the Buffalo Creek road, near Filmore avenue Buffalo, for a new car wheel plant, to be operated by the Buffalo Wheel Foundry Co. The buildings will be of brick and will have a capacity for manufacturing 500 car wheels daily.

The Jackson & Wocdin Mfg. Co., of Berwick, Pa., has placed the contract for a new car wheel foundry with the Berlin Iron Bridge Co. The building will be from the designs of the Berlin Co., made entirely of iron.

A New Ocean Record.

The "City of Paris" has again broken the world's record for her trip from Queenstown to New York. On the 27th of July last she arrived at New York, having made the run from Queenstown in 5 days, 15 hours and 58 minutes. At 1:02 a. m., Oct. 19, she passed the Sandy Hook light house at the end of her 29th westward voyage, having made the run in 5 days, 14 hours and 24 minutes, beating her July record by 1 hour and 34 minutes. She also beat the best run for 24 hours by 10 miles, having made 530 knots on Oct. 18, as against her previous record of 520 on July 26. The average speed of the whole voyage was 20.7 knots an hour. The following table shows the run by days in each of these trips:

	Knots.		Knots.
July 22.....	478	Oct. 13.....	448
July 23.....	501	Oct. 15.....	508
July 24.....	519	Oct. 16.....	503
July 25.....	504	Oct. 17.....	505
July 26.....	520	Oct. 18.....	530
July 27.....	525	Oct. 19.....	538
	2,785		2,782

Car Coupling.

The New York State Railroad Commission has extended for one year from Nov. 1, 1892, the time in which freight cars running in the state of New York must be equipped with an automatic coupler.

Big Electric Locomotives.

There is immense interest in the work doing by the Thomson-Houston Company in designing and building the electric locomotives to operate the Baltimore Belt Line tunnel. As we have several times said, these locomotives are required to take trains up a 40 ft. grade, and the trains are to be of 1,200 tons, hauled 15 miles an hour, or 400 tons hauled 30 miles an hour. We are able to publish the following particulars of the locomotives now building. The current is taken from overhead conductors, of 8 sq. in. cross section, by means of a trolley. The voltage is 700 approximately and the current for each motor 1,000 to 2,000 amperes. The armatures are directly on the driving axles. The driving wheels are 5 ft. diameter; speed, 30 miles and hour; electric horsepower developed, 1,500; weight of locomotive, 90 tons drawbar pull, 40,000 lbs.

Chicago Main Drainage.

The payment for September excavation, 87,820 cubic yards, was \$21,908.09. The finance committee report the sale of \$2,000,000 bonds to Blair & Co., of New York, for a premium of \$30,250 and accrued interest. The question of temporary relief from the present pollution of the drinking water has been before the Drainage Board, and Mr. Cooley made a lengthy report on the possible means, which was ordered printed. Impure water from the continual flow of sewage into the lake, and vitiated air from the polluted water in the north and south forks of the Chicago River are given as the main causes of the deaths from zymotic diseases for the two years past, and a pumping station is recommended, which seems to imply removing the plant now at Bridgeport to that point.

Ohio Falls Car Manufacturing Co.

The Ohio Falls Car Manufacturing Co., which some time ago took over the property of the Ohio Falls Car Works, of Jeffersonville, Ind., has completed its organization, and a portion of the preferred stock is offered for public subscription. The capitalization of the new company is \$800,000 eight per cent. cumulative preferred stock, \$400,000 of common stock and \$600,000 first mortgage six per cent. 30-year bonds. The stockholders of the old company have taken in part payment for its plant \$500,000 of the preferred stock and all of the common stock of the new corporation, \$600,000 of bonds, and the balance, \$300,000 of preferred stock is offered for public subscription by Maitland, Phelps & Co., of New York and other bankers. The property, including real estate, machinery, etc., has been appraised at \$1,866,803. The land includes 62 acres in Clarksville, adjoining Jeffersonville; the buildings are 70 in number, 51 being of stone and brick. The capacity of the works is five passenger cars a week and 25 freight cars a day, employing 1,500 to 2,000 men, with an annual output approaching \$3,000,000 in value. The directors of the new company are: J. L. Smyser, President; M. E. Duncan, First Vice-President and General Manager; Dallas B. Pratt, Second Vice-President, New York; J. D. Stewart, Secretary and Treasurer; Thomas L. Barret, Atilla Cox, John Stiles and J. M. Atherton, Louisville, Ky., and S. C. Taggart, Jeffersonville, Ind.

Steam Heating Valve for Locomotives.

The Consolidated Car Heating Co. is introducing a special throttle valve to put on the locomotive, for the purpose of controlling the connection by which steam is supplied to the train. This valve is made somewhat after the style of the valve furnished by the Westinghouse Air Brake Co., for controlling the admission of steam to the air-brake pump. It, however, is made for 1 in. pipe instead of ¾ in. It has a connection for the dry pipe, and is substantial. This valve is also so designed that it can be placed in a horizontal position at the side of the boiler, should there be lack of space on top. It is so arranged that the dry pipe connection may be made by the means of a bushing, and entirely independent of the valve. The valve may be placed directly on the boiler, or at any other convenient position in the steam pipe.

The Consolidated Company has also put on the market a dust guard for the Sewall coupler which is effective and simple. It is attached to the support chain of the Sewall coupler, and when the coupler is not in use it holds the coupler up and closes the end. Samples will be sent to any railroad upon application to any of the officers of the Consolidated Company.

Car Couplers.

The Union Tank Line is building 50 new cars for the California trade equipped with M. C. B. couplers. Twenty-five of these, building at Buffalo, are to have the Smillie coupler, and 25, building at Cleveland, are to have the Buckeye. These are the first cars equipped by this company with the vertical plane coupler except the narrow gauge cars running in New Mexico.

The Niagara Tunnel.

The great Niagara tunnel is rapidly nearing completion and will be ready for use before any of the manufacturing companies, which propose to make use of it, can excavate for their wheel pits and make connection with the tunnel and supply canal. Work on the latter is well advanced on the section which it is proposed to finish at present, that is, from the river to the large pit in which turbines aggregating 15,000 H. P. will be placed and which constitute the motive power for the first central station. It is thought that these wheels may be in place and ready for use by Jan. 1. They will probably be built in this country from the designs of the firm of Swiss engineers whose plans were adopted.

The buildings of the Niagara Paper Co. are nearly completed and comparatively little work remains to be done on their wheel pit in which two turbines of 3,000 H. P. each will be placed. The Construction Company provides the tunnel for use as a common tail race and the main supply canal with openings in the side walls and gates by which water will be supplied to manufacturing plants; out the latter are to build their own supply canals, or head races, from the gates to their wheel pits and their branch tunnels by which the tail water will be led from their wheels to the main tunnel.

Steel for Car Couplers.

The following is the chemical analysis as made by Chauvenet Bros., of the steel which is being used by the Shickle, Harrison & Howard Iron Co., of St. Louis, in the manufacture of steel for car couplers:

Carbon	18 to .25
Sulphur	trace.
Phosphorus	trace.
Silicon	nil.

This steel as tested at Washington University testing laboratory gave the following results: Tensile strength per square inch, 65,000 to 70,000 lbs.; elongation, in 8 in., 18 per cent.; reduction in area, 25 per cent. This company is making automatic couplers of six different patterns.

A New York-Chicago Telephone.

The American Telephone & Telegraph Co. opened its first telephone line between New York and Chicago Tuesday afternoon, the first message being sent by Mayor Grant, of New York, to Mayor Washburne, of

Chicago. The line extends from the general office of the company, 18 Cortlandt street, by quite direct highway routes to the Chicago office, 105 and 107 Quincy street. The principal points on the line are Newark, N. J., Harrisburg and Pittsburgh, Pa., Cleveland and Toledo, O., and South Bend, Ind. The line is 950 miles long and built in the most substantial manner. The poles are chestnut, 45 to the mile, the total number being 42,750. There is a complete metallic circuit of two hard drawn, No. 8 copper wires, 435 lbs. per mile, the total weight of copper in the circuit being 826,500 lbs. These wires are of about four times the area of the usual long-distance telephone lines. No cables are used except where absolutely necessary, as crossing rivers near New York. Some difficulty was experienced at this end in understanding Mayor Washburne's reply, but it is supposed to have been due to the large number of receivers attached—40 in all. A gathering of distinguished electricians and public men witnessed the test. Previous to this the longest telephone line in existence was the one from Paris to Marseilles 550 miles.

Pintsch Gas Lighting.

Prof. J. E. Denton, of Stevens Institute of Technology, has been making thorough experiments testing the candle power of Pintsch gas and of oil lamps. The substance of the report shows that Pintsch gas is capable of affording an illumination of 40 candle-power, continuously, in an ordinary 4-flame lamp, without requiring anything more than the ordinary attention to lamps by railroad employes; whereas the latest improved argand burners with oil, cannot be made to give more than 16 candles per burner, and with the best form of flat flame, double wick lamps, not more than 8 candles per burner. This shows an average of $2\frac{1}{2}$ to 5 times more illumination by the gas than by the oil, and the tests further show that the heat generated from the oil is 50 per cent. greater than that from the Pintsch gas.

Marine Notes.

The U. S. lighthouse tender "Maple" was launched on Wednesday last at 1 P. M. from the yard of the Samuel L. Moore & Sons Co., at Elizabeth, N. J. The "Maple" is the second government vessel launched from this yard. The principal dimensions are: Length over all, 164 ft.; length on load line, 155 ft.; beam molded, 30 ft.; depth of hold, 11 ft. 10 in.; displacement, 550 tons. The "Maple" is a twin screw vessel, having two inverted fore-and-aft compound engines, with 16 and 31 in. cylinders and 24-in. stroke. Steam is supplied by two cylindrical, single-ended, return tubular boilers placed fore and aft in separate compartments. The boilers are 12 ft. long by 11 ft. 9 in. diameter, with two Fox patent corrugated furnaces each. The vessel is rigged as a two-masted schooner, with a large derrick boom on the foremast, and has a pump brake windlass forward and two double cylinder and one single cylinder hoisting engines on the main deck. She is also fitted with powerful fire pumps and a complete electric light plant, with two search lights, one on each side of the pilot house.

Two large tugs, the "Honeybrook" and "Plymouth" have been delivered to the Reading by the Neale & Levy Shipbuilding Co. They were originally ordered by the Lehigh Valley Railroad and are 135 ft. long, with 27 ft. beam and 15 ft. depth of hold. The engines are of the triple expansion type and are furnished with steam from Scotch boilers.

The International Navigation Co. has been awarded the contract for carrying the United States mails, in return for which it agrees to provide a semi-weekly service to Southampton, and a weekly service to Boulogne and Antwerp. The "City of Paris" and the "City of New York," with five steamers to be built, will constitute the fleet. The new vessels will be constructed by the Cramps, and will have a speed of twenty knots in fair weather, and be officered by Americans. Designers are now at work upon the new ships, but nothing definite has been settled as to the plans.

Proposals have been issued by the Navy Department for a new battleship of 9,000 tons displacement and a cruiser of about 8,000 tons. The battleship is to have an average sea speed of 16 knots and the cruiser 20 knots, a premium of \$50,000 being paid for each quarter knot in excess of these speeds. Among the detail improvements which will be introduced into these vessels will be armor protection for the tubes through which the ammunition passes from the magazine to the turrets. Smoke stacks 100 ft. high are another innovation, which is intended to do away with the forced draught, and carry the smoke and gases above the military tops. The new vessels are to be completed within three years of the date of the contract.

Lake Ship Building Notes.

The Cleveland Ship Building Co. has on the stocks a monitor steamer which is 324 ft. long on the keel, 42 ft. beam and 24 ft. deep. It is to have triple expansion engines having cylinders 20, 33 and 54 in. in diameter, by 40-in. stroke, and two Scotch boilers, 12 ft., 4 in. in diameter, by 13 ft. long. They are also building a twin screw freight steamer for the Bradley Transportation Co., which is of about the same dimensions as the above. The boilers for the whaleback passenger steamer for the World's Fair are being built at these works.

The Globe Iron Works Co. have the keels laid for the two large passenger steamers for the Northern Steamship

Co., of which the general dimensions were recently published in the *Railroad Gazette*. This company has just finished the steam yacht "Comanche," which is 136 ft. long and is intended for sea service.

The Craig Ship Building Co., of Toledo, have nearly finished the first transfer steamer for the Toledo, Ann Arbor & North Michigan, which was recently illustrated in the *Railroad Gazette*. The sister boat to this is on the stocks and is rapidly being completed. It will be remembered that an interesting peculiarity of these boats is the use of three engines which are placed, two in the stern, driving twin screws, and the other in the bow connected with the single screw. This company also has the keel laid for a fire tug for the city of Detroit.

Spirals for an Electric Railroad.

A daily newspaper tells us that a Baltimore engineer has designed "a new kind of curve for use on electric railroads, which he calls a compound curve for spiral formation." Doubtless the Baltimore engineer does not claim to have discovered anything new, but his application of easement curves on electric railroads may be new, and it is certainly sensible.

Steel Dome Covers.

The Brooks Locomotive Works are making steel dome covers for a lot of engines for the C., C. & St. Louis Railroad. These covers are formed from sheet steel about $\frac{1}{8}$ in. thick, the parts of double curvature being hammered into shape and the separate pieces connected by inside butt straps riveted on. The whole makes a very light and neat appearing dome cover, but evidently calls for very careful work in its formation.

THE SCRAP HEAP.

Foreign Notes.

In the matter of the Ariberg railroad, in Switzerland, on which, as already noted, traffic has been seriously hampered and was for a time completely stopped, by heavy rock falls and land slides, it has been finally decided to re-establish the line by tunneling through the debris. The tunnel will be about 1,500 ft. long.

A train for fire extinguishing purposes on the Nicholas railroad, in Russia, is spoken of as one of the noteworthy exhibits at the recent international railroad congress, at St. Petersburg. Two such trains are in use on the road in question and are always held ready for any emergency which would require their presence at any point along the road. Each train comprises a passenger car for 20 firemen, one platform car carrying water reservoirs, and one platform car carrying pumps and barrels.

A traveler's accident insurance system, modeled after the plans of existing railroad passengers' insurance companies, has been developed by a Magdeburg (Germany) insurance company, and promises to become popular among the German traveling public. The policies are to cover not only railroad and steamboat accidents, but also all mishaps encountered in wagons, cabs, sleighs, horse cars and omnibuses. The range of the policies is to extend from 2 days to 10 years.

Interest in the disastrous Mönchenstein bridge collapse, in Switzerland, which happened over a year ago, is being revived by the judicial proceedings which are now in progress. The *Schweizerische Bauzeitung*, in its issue of Sept. 24, devotes some space to the matter, briefly reviewing the salient features of the accident, and summing up the presentation of the case to the Swiss Federal Court by the State's attorney. The conclusion arrived at by this functionary is that the whole investigation made, has developed no evidence to show that anybody concerned in the matter has been culpably negligent, and he accordingly proposes dismissal of the case.

World's Fair Notes.

Bids have been received for the construction of a Naval Observatory to cost \$1,885, an army hospital to cost \$17,245 and a weather bureau building to cost \$5,965.

Two of the elevated tracks are so nearly complete that they were used for handling through trains during the dedicatory exercises. The suburban trains were run on the four tracks which are still at the old level.

The Illinois Central has erected two picket fences about 8 ft. high inclosing its western track just south of the Van Buren street station for facilitating the handling of the visitors to the dedicatory exercises. These fences are long enough to accommodate a train of eight cars, and five gates and ticket booths have been provided.

Extensive preparations are being made to provide hotel accommodations for the immense number of visitors who are expected at the World's Fair. A large number of hotels and apartment houses are now under way involving an expenditure of about \$3,000,000. These buildings are of brick and stone in the district west of Jackson Park, as the fire limit extends to Sixty-seventh street. These are, of course, intended to be permanent structures. South of Sixty-seventh street, preparations are being made for building a large number of hotels which will be temporary constructions, as they are outside of the fire limits. Plans have been made for no less than 44 hotels, and construction has been begun on many of them.

Street Railway Projects.

The Superior Rapid Transit Co., of West Superior, Wis., is building 12 miles of extension this year, including one to South Superior. When this work is completed the company will have in operation 23 miles of electric railroad.

The Last of a Famous Locomotive.

A famous locomotive was wrecked lately at BO office, just above the city. It was No. 1,149, the engine that on the memorable day of the Johnstown flood went rushing down the Pennsylvania Railroad tracks from Conemaugh to Johnstown with its shrieking whistle giving the alarm of the oncoming deluge of water. After the flood No. 1,149 was found, bottom upward, buried under a bank of sand, near where the engineer had abandoned it to flee far his life from the flood. After things had quieted down No. 1,149 was set on its feet and brought to Altoona. After a week in the shops it came out again showing no signs of the ordeal it had passed through. Since then it has been run as a shifter. Yesterday about noon No. 1,149 was standing on the track near the BO telegraph station. Just below it was

a heavy coal train, stationary, with all brakes set. Engineer W. D. Thomas happened to look back over the track and saw another coal train, without an engine, come tearing down the steep grade. The switch had not been turned to allow it to drop down on the next track, as was intended. Thomas jumped just before the crash and escaped, but No. 1,149 was turned bottom up and demolished between the two heavy coal trains.—*Altoona Gazette*.

Coal on Puget Sound.

The Bellingham Bay & British Columbia Railroad, which has had a diamond drill at work near New Whatcom, Wash., for eight months past, has struck a vein of coal 15½ ft. thick at a depth of 410 ft. The prospect hole is located within the city limits. About \$21,000 has already been expended and more holes will be sunk.

Wheeling Water Works.

The City of Wheeling, W. Va., has contracted with the Holly Company for a complete new water works, except reservoir, to be erected in the Ohio River about two miles above the city. The plant will have a pumping capacity of 7,500,000 gallons daily, for each pump, or a total of 15,000,000 gallons. The plant will be so arranged that the direct system may be used when the reservoir is being cleaned or in case of accident to that part of the plant. The work is to be paid for with extension notes, given by the water works trustees, to be paid out of the revenues of the plant. The cost will be \$275,000.

The Reading Combination.

The Attorney-General of the state of New Jersey has made application in the Court of Chancery of that state for a receiver for the Central of New Jersey, the Philadelphia & Reading, the Port Reading, the Easton & Amboy, the Lehigh Valley Terminal and Bound Brook. The application is made on the ground that these railroads, in consolidation, have advanced the price of coal in defiance of the order of the court. An order is asked restraining the roads from carrying coal until the price has been put back to the figures prevailing before the combination was made. Chancellor McGill required the various roads to show cause on Oct. 27 why a receiver should not be appointed.

Work and Wages.

The Missouri Pacific compromised the demands of the telegraph operators for increased pay, allowing them an advance of \$45,000 in the aggregate. Under the revised schedule the minimum salary will be \$50 per month on the main lines and \$45 on the branches.

The Philadelphia & Reading has issued an order requiring all conductors and baggagemen on the New England Division to give bonds of \$300 on penalty of dismissal.

The St. Louis Southwestern has refused the request of the trainmen for an advance of wages, but some modifications of the rules have been made.

Cholera Quarantine in Canada.

Emigrant suspects going West over the Grand Trunk are detained in the yards at Sarnia, where a sort of quarantine station has been established. Several box cars are provided for fumigating baggage, etc. The emigrants are thus held at the Canada end of the St. Clair tunnel, but as it is understood that there are no guards to prevent them from visiting the town of Sarnia and no apparent obstacle in their path to the United States by way of the ferry between Sarnia and Port Huron, the safety of the latter town from cholera invasion, if danger exists, seems to lie in the emigrant's well known reluctance to being separated from his baggage.

Possible Movement of Troops.

Incidental to the war flurry occasioned by the Chilean affairs, officers of the various railroads received communications from Government officials asking for information relative to the movement of troops in large bodies. Secretary Elkins has received a letter from J. T. Odell, General Manager of the Baltimore & Ohio, stating that since the G. A. R. encampment at Washington he is able to reply to the inquiry. The four trunk lines, he says, can move from the interior to the coast, taking the mean distance of 1,000 miles, 350,000 troops in 30 hours, together with their necessary equipments, horses, etc., and supplies. At the same time, he says, these roads can move enough commercial supplies so as not to affect the general business of the country.

A New Express Contract.

The Adams Express Co. will replace the United States on the Queen & Crescent route. The change is simply a question of money, the Adams having outbid the United States for the privilege.

Homestead.

It is officially announced that Mr. Potter has resigned as General Superintendent of the Carnegie Mills at Homestead. He remains as Chief Mechanical Engineer. He is succeeded by Mr. Schwab, General Superintendent of the Edgar Thomson Works.

The New Hamburg Accident.

The New York State Railroad Commission has decided that the bridge tender and signal man at the New Hamburg drawbridge were responsible for the accident which happened there two months ago. It will be remembered that the train ran into an open draw.

Strikes.

A strike of telegraphers on the Gulf, Colorado & Santa Fe, began Sunday night Oct. 16 and still continues. Traffic on the entire system is much interfered with, but passenger trains are kept moving with some regularity.

The switchmen on the Cleveland, Cincinnati, Chicago & St. Louis at Columbus, about 90 men, went on strike Oct. 10. The reasons for the strike are a demand of the strikers for the Cincinnati scale, \$2.70 and \$2.90 a day. They now receive \$2.58 to \$2.76. By Oct. 13 the company had a full force of men at work in the yards. A number of strikers who interfered with the movement of engines were arrested.

President Jeffrey, of the Denver & Rio Grande, issued an ultimatum last Tuesday calling on the striking trainmen to report for duty or consider themselves discharged. He declined to treat with any committee until all trains were moving regularly. This attitude on the part of the President had a good effect. The strikers' committee telegraphed saying that the men would go to work pending an investigation, and during Wednesday trains were got to moving regularly over the entire system.

A strike is threatened on the Mexican Central. The American machinists in the shops at the City of Mexico went out for an increase of 60 cents a day. They were receiving \$4. The machinists of the San Luis Potosi division have also struck.

LOCOMOTIVE BUILDING.

The Rio Grande Western will receive this month three compound locomotives from the Baldwin Locomotive Works, which are duplicates of the compound engine built for the road early in the spring.

The Pittsburgh Locomotive Works has recently delivered to the St. Louis, Vandalia & Terre Haute a number of heavy simple 10 wheel passenger locomotives having 20x26 in. cylinders, 72 in. driving wheels and weighing in working order about 137,000 lbs.

The country has just been startled by the statement that the Erie has turned out at the Susquehanna shops a passenger locomotive with drivers 7 ft. in diameter, the whole machine painted fiery red. The notion of the reporter apparently is that the Erie proposes to scare the life out of the New York Central and the Pennsylvania. The facts are, that this engine, No. 331, is of the standard class "O," 10-wheel passenger engine used on the Erie. The drivers are 68 in. in diameter, cylinders 20 by 24 in., and weight 127,000 lbs. It is true that the engine has been painted red. It is proposed to test with this engine the value of a Belgian steel jacket, instead of planished iron, the saving of first cost being considerable. Therefore the engine is painted, and the color selected is tuscan red, the standard of the passenger equipment of the road.

CAR BUILDING.

The Wabash Railroad has ordered 500 30-ton coal cars, equipped with automatic couplers, from the Madison Car Works. These are for immediate delivery.

The Duluth, Mesabie & Northern has ordered 575 ore cars from the Duluth Mfg. Co., and four passenger cars and two combination cars from the Ohio Falls Car Co.

The Billinger & Small Co., of York, Pa., is now filling an order for six narrow-gauge passenger cars for the Cartagena & Magdalena railroads, of Colombia, S. A. These cars are finished in yellow pine for the reason that this is the only wood not eaten into by the white ant which infests that country.

BRIDGE BUILDING.

Bellaire, O.—The Baltimore & Ohio has prepared plans for the erection of a new bridge over its tracks at Bellaire, to replace an old wooden structure. The new bridge is to be of steel and will carry Union street over the tracks. The city council of Bellaire is negotiating to divide the expense of a second bridge to carry another street over the same tracks.

Brantford, Ont.—Messrs. J. G. Pocach and Wm. Hancock, of Hamilton, have been awarded the contract for the masonry work of the Toronto, Hamilton & Buffalo Railroad bridge at this city.

Bridgeport, Conn.—The draw in what is called the Washington Bridge has been reported to be in a dangerous condition. Instead of replacing the draw, it is probable that the county commissioners will build a new bridge and surveys are now being made for a new site.

Camden, N. J.—The Camden County freeholders last week authorized the bridge committee to contract for the new bridge over Cooper's Creek at Federal Street, and the contract was at once awarded to B. F. Sweeten & Sons. This firm was the lowest bidder when the proposals were opened some months ago, but the award has been postponed owing to the refusal of one of the freeholders to sign the contract.

Cumberland, Md.—The foundation piers for the 1,500 ft. iron viaduct of the West Virginia Central & Pittsburgh at this place are completed, and 10 carloads of the iron superstructure have arrived and will be put into position as rapidly as possible. A. and P. Roberts, of Philadelphia, have the contract.

Harrison County, W. Va.—A new steel bridge of 150 ft. span over West Fork River in Harrison County, on the Baltimore & Ohio, was put in position last Wednesday. The tearing down of the old bridge and replacing it with the new one occupied just three hours and fifty-three minutes.

Hendricks, W. Va.—The County Court of Tucker County has under consideration plans for a steel highway bridge over Little Black Fork River at Hendricks, in that county.

Iron Mountain, Mont.—The contract for building a bridge across the Missouri river between Iron Mountain and Superior has been awarded to the San Francisco Bridge Co., the cost to be \$8,380. The bridge will consist of two spans, each 225 ft. long, resting on a tabular iron pier in the centre.

Little Rock, Ark.—The Little Rock Bridge Co., organized by W. H. Ragland, H. C. Bateman, George M. Street and others, filed a charter last week to build the proposed highway bridge across the Arkansas River at Little Rock, which has been a matter for local discussion for over a year. The capital stock of the company is \$250,000.

Memphis, Tenn.—The plans drawn up for the proposed bridge at La Rose street have been rejected and it has been agreed by the city engineer and the chief engineers of the Kansas City, Fort Scott & Memphis and the East Tennessee, Virginia & Georgia that new plans be prepared by D. W. Lum, Chief Engineer of the latter road. The expense of building this bridge is to be borne by the Memphis railroads.

Riverton, Pa.—The Cumberland Valley and Northern Central railroads have begun the erection of an iron bridge at Riverton, immediately across the Susquehanna River from Harrisburg.

Topeka, Kan.—The City Engineer has prepared plans for a new bridge across the Shunganunga Creek on Sixth avenue, Topeka, which is to cost \$2,871. Part of the cost will be paid by the Topeka Street Railroad. The City Clerk has been directed to advertise for bids.

West Elizabeth, Pa.—The Pittsburgh, Virginia & Charleston has been petitioned to build a bridge over the Monongahela River at East and West Elizabeth, Pa.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Sandusky & Cleveland, quarterly, 3 per cent., on the preferred stock, payable Nov. 1.

Lake Erie & Western, quarterly, 1½ per cent., on the preferred stock, payable Nov. 15.

Lake Superior & Western, 1¼ per cent., on the preferred stock, payable Nov. 14.

Nashville, Chattanooga & St. Louis, quarterly, 1½ per cent., payable Nov. 1.

New York, Susquehanna & Western, 1½ per cent., on the preferred stock, payable Nov. 10.

Pittsburgh, Cincinnati, Chicago & St. Louis, 2 per cent., on the preferred stock, payable Oct. 25.

Pulman's Palace Car Co., quarterly, \$2 per share, payable Nov. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama & Vicksburg, annual, Jackson, Miss., Nov. 7.

Atchison, Topeka & Santa Fe, annual, Topeka, Kan., Oct. 27.

Central Massachusetts, annual, Boston, Mass., Oct. 26.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 26.

East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 16.

Manhattan, annual, New York City, Nov. 9.

Montreal & Champlain Junction, special, Montreal, Quebec, Oct. 24.

New Orleans & Northeastern, annual, New Orleans, La., Nov. 2.

Philadelphia, Newtown & New York, special, Norristown, Pa., Nov. 28, to consider an increase of bonds to \$1,000,000.

Toledo, St. Louis & Kansas City, special, Toledo, O., Nov. 14, to consider an increase of bonds to \$13,500,000.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Roadmasters' Association of America will hold its next annual meeting at Lookout Mountain Hotel, Chattanooga, Tenn., beginning Nov. 15, having been postponed from Oct. 18.

The New England Railroad Club holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The New York Railroad Club holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The American Society of Swedish Engineers holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The Engineers' Club of Minneapolis meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The Canadian Society of Civil Engineers holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The Association of Civil Engineers of Dallas meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The Technical Society of the Pacific Coast holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The Tacoma Society of Civil Engineers and Architects holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The Association of Engineers of Virginia holds reg-

ular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

The Engineers' and Architects' Club of Louisville holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

American Society of Civil Engineers.

A regular meeting was held at the house of the Society, Wednesday evening, Oct. 19. A short paper by Oscar Saabye on a Cheap Dam across the Roanoke River was read by the Secretary. For \$2,500 a dam was built across a mountain stream 65 or 70 ft. wide with 10 to 12 ft. of water, a swift current and subject to many freshets. This was not discussed, the time being reserved for the second paper.

Mr. John P. O'Donnell, of London, read a paper on interlocking and signaling.

He is an English signal engineer of much experience, and has been some weeks in the United States studying our methods. The preliminary part of this paper was given to some discussion of English and American practice, and the larger part of it to the great installation of 236 levers at Waterloo Bridge, London, which has been somewhat described in these columns. There was a long and animated discussion of this paper, which was an interesting variation from the stock subjects generally treated in the Society papers.

Civil Engineers' Club of Cleveland.

The regular meeting of the Civil Engineers' Club was held in the club rooms Oct. 11. President Staley, of Case School of Applied Science, presented a report upon the Fifth International Congress of Interior Navigation. Mr. C. F. Uberlacher read a paper on the subject, "Historical Sketch of Storage Batteries." Mr. E. P. Roberts gave an informal talk on "Preliminary Surveys for an Electric Light Station." Hiram E. Baldwin, Frank Felkel and Clarence H. Burgess were elected members.

Engineers' Club of Philadelphia.

A business meeting was held Oct. 1, 1892, President James Christie in the chair, 39 members and visitors present.

The Secretary announced that Mr. Joseph M. Wilson having declined, on account of press of other business, to serve as the Club's representative to aid the committee of the American Society of Civil Engineers, by the suggestion of suitable persons to furnish papers for the meeting of the World's Congress Auxiliary of the Chicago Exposition, the President had appointed Mr. John C. Trautwine, Jr. Upon motion the meeting confirmed this appointment.

Mr. Strickland L. Kneass read a paper on "The History and Development of the Injector," giving a detailed description of the Gifford Injector as originally constructed, and the improvements devised to overcome the objections urged against it. The self-regulating principle, as embodied in the movable combining tube and the double jet injector, was explained, and interesting statements were given regarding the extended use of the injector as a boiler feeder at the present day.

Mr. Carl G. Barth gave an interesting blackboard discussion of the "Distribution of Pressure in Bearings," maintaining that the centre of pressure in an ordinary step bearing should be taken at one-half the radius, instead of two-thirds, as is usual.

Franklin Institute.

The Committee on Science and the Arts, at its stated meeting of Oct. 5, considered reports on the following subjects: Professor Perry's Continuous Indicator, Baldwin's Boiler-tube Cleaner, Mackay's Quick-operating Valve, the Rosendale Belting Company's Camels-hair Belting, Becker's Mirror Gauge, Brown's Emergency Governor for Marine Engines, Marks' Improvement in Artificial Limbs, Spencer's Damper Regulator, Clarke's Improvements in Safety Vaults. In the case of Baldwin the Committee recommended the award of the Scott Legacy Premium and Medal; and in the cases of Mackay and the Rosendale Company the Longstreth medal was granted.

Superintendents of Bridges and Buildings.

The annual convention of Superintendents of Bridges and Buildings met at Cincinnati, Oct. 18. In the absence of President O. J. Travis, of the Iowa Central, H. M. Hall, of the Ohio & Mississippi, Vice-President of the Association, presided. Secretary C. W. Gooch reported 20 charter members present. The morning session was principally occupied in considering the names of 56 applicants for membership.

PERSONAL.

—President J. J. Hill, of the Great Northern, is on Puget Sound arranging for the coast terminals of that line.

—Mr. Robert Reid, who has been Treasurer of the Ohio & Mississippi since May, 1887, died at his home in Cincinnati, Oct. 11.

—Hon. Samuel Babcock, ex-President of the Connecticut Valley Railroad and of the Middletown Savings Bank, died in Middletown, Conn., Oct. 13, aged 70.

—Mr. J. L. Woods has been appointed General Agent for McKee, Fuller & Co., of Catasauqua, Pa., makers of steel tired car wheels, etc. His office will be at 210 Phenix Building, Chicago.

—Mr. James L. McLane succeeds Mr. J. M. Jarvis, of Kansas City, as President of the Roland Elevated Railway Company, of Baltimore. The construction of this line is now going ahead satisfactorily.

—Chairman Aldace F. Walker of the Western Traffic Association, is to resume the practice of law either in Chicago or New York on the termination of his engagement with the Western Traffic Association.

—Mr. W. M. Newbold, Superintendent of the Alabama lines of the Louisville & Nashville, has been seriously ill at Birmingham for some time, but was well enough to be moved last week to Pass Christian, Miss.

—Mr. W. H. Stearns, for the last five years Roadmaster on the Chicago & Northwestern, has been appointed Superintendent of Bridges and Buildings for the Galena division or that road. Mr. Stearns is a prominent member of the Roadmaster's Association.

—Mr. W. A. Stevenson, who has been Superintendent of the Seneca Division of the Lehigh Valley from Sayre to Manchester, has been assigned to other duties and the jurisdiction of Mr. T. H. Fennell, Superintendent of the Buffalo Division, has been extended over it.

—Mr. James E. Ingraham, President of the South Florida road since it was first put in operation, has resigned, and has accepted a position with the Jacksonville, St. Augustine & Halifax River road "East Coast Route," as Mr. Flagler's representative for his Florida interests.

—Mr. James I. Bennett, formerly of the firm of Graff, Bennett & Co., of Pittsburgh, and at one time President of the Pittsburgh & Lake Erie Railroad, died of pneumonia last week. Mr. Bennett was for nearly half a century one of Pittsburgh's most prominent business men.

—Mr. George Gramling, Master Car Builder of the South Carolina road, died in Charleston, S. C., Oct. 8, after an illness of several weeks. Mr. Gramling was formerly connected with the Richmond & Danville at Atlanta, but he had lived in Charleston for about 12 years.

—Major Virgilus Freeman, the constructor of the Norfolk & Virginia Beach road and a well known engineer, died in Norfolk, Va., last week, aged 59. He was formerly a chief engineer in the United States Navy, but resigned to accept an office in the Confederate service.

—Mr. George Barnes, who was Superintendent of the Syracuse & Utica before it was merged with the New York Central, died in New York city Oct. 17. He was also at one time Superintendent of the Marietta & Cincinnati road, but since 1857 had been engaged in banking and manufacturing at Syracuse, N. Y., and acquired a large fortune.

—Mr. F. W. Tracy, of Springfield, Ill., who has been a director for some years, was elected President of the road at the recent annual meeting, which resulted in the election of directors favorable to the proposed agreement with the Baltimore & Ohio, which Mr. Tracy has favored. Mr. J. F. Barnard has been President of the road for the last five years, and his term as a member of the board of directors does not expire until 1894.

—Mr. Charles Stiff, Superintendent of the Southern Division of the Grand Trunk, with headquarters at Hamilton, Ont., has resigned and the office has been abolished. The division has been included in the jurisdiction of Mr. James Stephenson, who has been Superintendent of all the lines except the Southern division. The retiring superintendent has been in the service of the Grand Trunk 28 years and has been Division Superintendent since 1876.

—Mr. Charles F. Spaulding, Superintendent of the New London Northern Division of the Central Vermont has resigned and will retire Nov. 1, continuing to live at New London, Conn., but not engaged in business. Mr. Spaulding was connected with the old Rutland road for a number of years and became General Freight Agent of the New London Northern in 1871. He was appointed Superintendent in 1883 and was continued in charge of the road when it was leased to the Central Vermont.

—Mr. C. E. Fuller, Jr., Master Mechanic of the Eastern division of the New York, Lake Erie & Western, at Jersey City, has resigned to accept the position of Superintendent of Motive Power of the Central Vermont with headquarters at St. Albans, Vt. On retiring from office the employees under Mr. Fuller gave him a supper and presented him with a handsome testimonial, signed by all the men in the motive power department on the division. Mr. Fuller had been Master Mechanic on the Erie for over two years.

—Mr. Richard P. Morgan, of Dwight, Ill., is now engaged in the preparation of a report for the State Railroad Commissioners of California, "upon what would be equitable rates and fares on the railroads in the state, taking into account the operating expenses and other matters affecting the operation of the road." The alleged unjust discrimination of the Southern Pacific in local rates has furnished a topic for a voluminous newspaper discussion, and the freight association of which ex-Traffic Manager Leeds is Chairman has done much to keep the discussion of practical importance, so that altogether people on the Pacific coast have an unusually lively interest in railroad tariffs.

—Mr. P. J. McGovern, General Freight Agent of the Georgia Pacific Division of the Richmond & Danville, has resigned to become Assistant Commissioner of the Southern Railway & Steamship Association. Mr. McGovern was formerly Assistant General Freight Agent of the Louisville & Nashville, but resigned in December and became connected with the Richmond & Danville, first as Chief Clerk to the Traffic Manager, and in May as General Freight Agent of the Georgia Pacific Division. His successor in the latter office is Mr. Haiden Miller, Division Freight and Passenger Agent of the Plant System in charge of the Alabama Midland road.

—Col. H. T. Douglas, Chief Engineer of the Baltimore & Ohio, has resigned. Mr. W. T. Manning, Assistant Chief Engineer, has been assigned the duties of Chief Engineer for the present. Col. Douglas succeeded the late James L. Randolph as Chief Engineer more than three years ago. Owing to poor health he obtained leave of absence during the summer, which was spent mostly in Europe. He returned to his duties Sept. 1. Mr. Manning has been connected with the company 19 years. He was recently made Chief Engineer of the Belt Railroad Company to succeed Mr. Richard Randolph, and he is also Consulting Engineer of the Pittsburgh & Western and Chief Engineer of the Staten Island Rapid Transit road.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Col. H. T. Douglas having resigned the position of Chief Engineer of this company, taking effect Oct. 12, the duties of the office, until otherwise directed, will be assumed by Assistant Chief Engineer W. T. Manning.

Baltimore & Ohio Southwestern.—At the annual meeting of the shareholders at Cincinnati the following directors were elected: E. R. Bacon, W. W. Peabody, W. P. Harvey, H. W. Poor, Orland Smith, Patrick Buttan, G. H. Hopkinson, W. T. McClintick, Amos Smith, W. F. Alms and Lowe Emerson. The new board re-elected the present officers.

Boston & Providence.—The following directors were elected for the ensuing year: Thomas P. I. Goddard, William R. Robeson, Royal C. Taft, Robert H. Stevenson, Roger Wolcott, John Lowell and Edward W. Hooper.

Butte, Anaconda & Pacific.—Marcus Daly, William L. Hogue, M. Kirkpatrick, Judson B. Losee and William Seillon are the incorporators of this Montana company.

Canada Western.—The incorporators of the British Pacific Construction Co., recently formed to build this road, are: R. P. Rithet, of Victoria, B. C.; E. Crowe Baker, Wm. F. Butler, Marvin, Wm. J. McCauley, Theodore Lubbe, Joshua Davies, Charles Vernon and Frank Lukeman, the latter of Chicago. The bankers are the Bank of British Columbia.

Central Vermont.—At the annual meeting the following directors were elected: Edward C. Smith, B. P. Cheney, L. J. Seargeant, B. B. Smalley, W. Seward Webb, J. R. Langdon, W. H. H. Bingham, R. Wright, F. S. Stranahan, John Bell, Robert Colt.

Cincinnati, New Orleans & Texas Pacific.—The annual meeting of the shareholders at Cincinnati, Oct. 17, was held. The following were elected Directors: W. P. Anderson, Calvin S. Brice, S. M. Felton, W. A. Goodman, Alexander McDonald, C. C. Harvey, Charles M. McGhee, Samuel Thomas, L. C. Weir. Mr. Weir was chosen in place of T. T. Gaff, and Mr. McGhee in place of John H. Immin. The directors re-elected Samuel Thomas, Chairman; S. M. Felton, President; Henry Fink and C. C. Harvey, Vice-Presidents; R. H. Tatem, Secretary.

Cincinnati, Plymouth & Virginia.—At the annual meeting of this company the following directors were elected: H. M. Hoyt, Jr., Samuel Hunt, Henry Lewis, A. B. Voorheis, John B. Keyes, H. C. Hollister, Crawford Arnold, T. H. White, Jr., and J. S. L'Amereux.

Columbus, Hocking Valley & Toledo.—William Michel is now Engineer of Maintenance of Way with headquarters at Columbus, O., succeeding John P. Ramsey, who resigned some weeks ago to accept the superintendency of the Ohio Southern road.

Danville & Mount Morris.—At the annual meeting of the stockholders, at 61 Broadway, New York, Oct. 18, the old Board of Directors was re-elected. The vacancy of the Presidency, caused by the death of Col. E. P. C. Lewis, was filled by the election of Palmer Campbell, of Hoboken. Col. Edwin A. Stevens was elected Vice-President, August Stein, Treasurer, and A. S. Murray, Jr., Secretary and Counsel.

Denver & Rio Grande.—The annual meeting took place at Denver, Oct. 19, 520,337 shares of stock being represented. The following directors were elected: George Coppell, Chairman; Richard T. Wilson, William Mertens, Charles C. Beaman and H. Baldwin, of New York; John Lowber Welsh and Edmund Smith, Philadelphia; Edward T. Jeffery and E. O. Wolcott, Denver.

Duluth & Winnipeg.—The North Star Construction Co., operating this road, has elected the following officers: F. Foley, President; W. P. Warner, Vice-President; W. H. Fisher, General Manager; John M. Schwartz, Secretary and Treasurer.

Grand Trunk.—The jurisdiction of James Stephenson as Superintendent has been extended over the Southern Division and also to include the train service on the lines heretofore under the jurisdiction of Edmund E. Wragge as Local Manager with headquarters at Toronto. The latter officer will be concerned with the arrangements for building the new Union station at Toronto and with the Toronto terminals.

Great Northern.—The annual meeting, held at St. Paul, Oct. 17, elected as Directors to serve three years: Jacob H. Schiff, of New York; Sir Donald A. Smith, of Montreal, and Edward T. Nichols, of New York. The directors elected the following officers: President, J. J. Hill, of St. Paul; Vice-President, Colonel W. P. Clough, of St. Paul; Secretary, E. T. Nichols, of New York; Treasurer, F. Sawyer, of St. Paul.

Hodgenville & Elizabethtown.—At the annual meeting of this company, held recently, the following officers were elected: President, Jacob Hubbard, and Secretary, C. F. Krebs. The directors are Jacob Hubbard, Hodgenville, Ky., M. B. Cutter, C. F. Krebs, Thomas W. Bullitt, John Echols, Thomas H. Hays and W. O. Harris, Louisville, Ky.

Illinois Central.—At the annual meeting held at Chicago, Oct. 12, T. C. Welles was elected a director, in place of Norman B. Reg, who had been filling the unexpired term of the late William W. Astor, S. Van Rensselaer Cruger and Charles A. Peabody, Jr., were re-elected as members of the Board of Directors.

Keokuk & Western.—A. McCrea has been appointed Assistant General Freight Agent and J. F. Elders, Assistant General Passenger Agent, with headquarters at Keokuk, Ia.

La Porte, Houston & Northern.—The following is a complete list of officers: A. M. York, President; I. R. Holmes, Vice-President; J. H. York, Treasurer; T. W. Lee, General Manager; C. G. Woodbridge, Chief Engineer, and A. O. Blackwell, Secretary, all of La Porte, Tex. The directors are A. M. York, T. W. Lee, J. H. York, I. R. Holmes, A. O. Blackwell, C. G. Woodbridge, La Porte, Tex., and R. R. Greer, Kearney, Neb.

Lehigh Valley.—Lewis H. Shearer, who has for the past 10 years been Roadmaster on the road, has been appointed General Roadmaster of the Buffalo Division between Buffalo and Sayre.

Minneapolis, St. Paul & Sault Ste. Marie.—Daniel Willard has been appointed Assistant Superintendent of the Wisconsin and Peninsular divisions, with headquarters at Gladstone, Mich. The office of trainmaster of the above division has been abolished.

Missouri Pacific.—Meade Stillwell has been appointed Division Superintendent of the eastern division with headquarters at Sedalia, Mo. Mr. Stillwell formerly held this position, but has been for some time a conductor on the Chicago & Eastern Illinois. Mr. Marsh, who has been Superintendent for nearly two years, resumes his old position as passenger conductor between Kansas City and St. Louis.

New Orleans & Northwestern.—A number of changes have recently been made in the organization of this company. William D. Jenkins and Charles H. Hammett have resigned as receivers; Louis K. Hyde, of Titusville, Pa., was appointed Receiver on Sept. 23, by the United States District Circuit Court. On Oct. 1, William D. Jenkins, of Natchez, Miss., was appointed General Manager; at the meeting of the stockholders, at Natchez, on Oct. 11, Charles H. Hammett, of Kansas City, was elected a director to fill the vacancy caused by the resignation of L. V. F. Randolph, of Plainfield, N. J. Mr. Hammett has also been elected President to succeed L. K. Hyde resigned.

Newport News & Mississippi Valley Co.—Claude Paxton has been appointed Traveling Freight Agent of the company, with headquarters at St. Louis, Mo., vice A. P. Guy, resigned to accept other employment.

New York & Long Island.—At their annual meeting, the stockholders, at 45 Broadway, New York, Oct. 19, chose the following directors: William Steinway, Henry B. Hammond, George A. Steinway, Louis von Bernuth, Malcolm J. Niven, Walter J. Foster, E. N. Dickerson, P. P. Dickenson, John Bogert, A. G. Mills, Thomas Rutter,

W. D. Baldwin and H. S. Kearney. The board elected H. B. Hammond, President; William Steinway, Vice-President, and M. W. Niven, Secretary and Treasurer. P. P. Dickenson was appointed Chief Engineer. The company was organized to tunnel the East River and the North River, and carry an underground connecting road across the city. No work is yet under way.

New York, New Haven & Hartford.—The following directors were elected at the recent annual meeting: E. H. Trowbridge, William D. Bishop, Nathaniel Wheeler, Henry C. Robinson, Charles P. Clark, Joseph Park, Chauncey M. Depew, Henry S. Lee, William Rockefeller, Leverett Brainard, J. Pierpont Morgan, Lucius Tuttle and George M. Miller.

Ohio & Mississippi.—The meeting of the stockholders took place at Cincinnati, Oct. 13. Gen. James H. Wilson was chairman of the stockholders' meeting. The result of the voting was a victory for the English shareholders. Their candidates were F. W. Tracy, of Springfield, Ill.; William S. Bull and Edgar T. Welles, of New York. The opposition voted for William Whitewright, Malcolm Campbell and Charles R. Flint. At the directors' meeting Messrs. McKim and Farnestock resigned, and Gen. James H. Wilson, of Wilmington, Del., and Edward R. Bell, of New York, were chosen in their places. The board elected F. W. Tracy, President.

Peoria Terminal.—The following is a list of the officers of this company: E. S. Easton, President; B. Warren, Jr., Vice-President and manager; William E. Stone, Treasurer; George S. Hall, Secretary, and C. E. Wickham, Chief Engineer, all of Peoria, Ill.

Philadelphia & Reading.—At a meeting of the Board of Managers of the company last week E. P. Wilbur, of Bethlehem, President of the Lehigh Valley Railroad, was elected a director in place of Thomas Cockran, resigned.

Philadelphia, Reading & New England.—E. W. Drinker having resigned on account of ill health, T. L. Painter has been appointed Division Freight Agent, New England Division, with office at Hartford, Conn.

Pullman's Palace Car Co.—The annual meeting was held in Chicago, Oct. 13, \$22,500,000 of capital stock being represented. The directors were re-elected as follows: Geo. H. Pullman, Marshall Field, J. W. Doane, Norman Williams and O. S. A. Sprague, of Chicago; Henry C. Hulbert, of New York, and Henry R. Reed, of Boston.

Rio Grande Southern.—At the annual meeting in Denver, Oct. 17, the following directors were elected: Otto Means, H. D. Barber, E. T. Jeffery, J. W. Gilluly, J. L. McNeil, F. Wilson, Arthur Coppell. The officers are: President, Otto Means; Vice-President, H. D. Barber; Secretary, J. L. McNeil; Assistant Secretary, W. W. Douglass, and Treasurer, J. W. Gilluly.

St. Paul & Duluth.—The annual meeting was held at St. Paul, Minn., Oct. 13. The following directors were elected for three years: C. S. Day, New York; James Smith, Jr., St. Paul, and A. H. Stevens, New York. President, R. S. Hayes, New York; Vice-President, A. B. Plough, St. Paul; Secretary-Treasurer, G. G. Haven, New York; Assistant Secretary and Local Treasurer, W. H. Coleman, St. Paul.

W. N. Schaff, First Assistant Purchasing Agent, has been appointed Purchasing Agent.

St. Paul, Minneapolis & Manitoba.—At the annual meeting in St. Paul, on Oct. 13, the following directors were elected: J. J. Hill, Sir Donald A. Smith, George Bliss, W. P. Clough, Samuel Hill, M. D. Grover and Edw. Sawyer. The following officers were elected: President, Samuel Hill; Vice-President, Sir Donald A. Smith; Treasurer and Assistant Secretary, E. T. Nichols; Secretary and Assistant Treasurer, Edward Sawyer.

Unadilla Valley.—The following are the officers of the company: President, William Forster, 27 East Fifty-fourth street, New York; Vice-President, E. A. Quintard, Citizens' Savings Bank; Treasurer, Frederic F. Culver, 80 Broadway, New York; Secretary, William L. Skidmore, New York.

Western Maryland.—William Keyser has declined to reconsider his determination to resign as a director, and Mayor Latrobe, of Baltimore, has appointed H. Crawford Black to the vacancy.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Atlanta Elevated Railway & Depot Company.—The company is likely to have considerable difficulty in securing right of way for its proposed elevated road, judged by the present attitude of the property owners along the route. It is not expected that the City Council will grant the ordinance asked for by the company for an elevated railroad over portions of Loid, Fair, Brotherton and Thompson streets in Atlanta. The elevated road will be double tracked, and about 1½ miles long with maximum spans of 60 ft., and will connect with the Georgia road at one end, and with the Central of Georgia near Thompson street. All the surveys have been made, and the cost of the work including the proposed Union station is placed at \$2,500,000. The road will be used for both freight and passenger traffic. The company expects to have the plans and specifications ready by Dec. 1, so that proposals may be called for by that date. H. T. McDaniel, of Atlanta, is Chief Engineer, and E. L. Corthell is Consulting Engineer.

Baltimore & Ohio.—The work of grading for the new yards and changing the tracks of this company at South Cumberland, Md., is progressing rapidly under the contract with Ryan & McDonald. The work has been held back somewhat on account of the heavy traffic making it impossible to abandon one of the tracks, but it is the intention to make room for the continuance of the improvement at once. Ryan & McDonald have two steam shovels at work and are preparing to increase the facilities for completing the work. The work thus far had been done with a view of removing a low place in the tracks by making a fill of about 10 ft. for a distance of about three miles. Heretofore there was an up and down grade in that distance. The road will be about level when the fill is completed.

Bangor & Aroostock.—The contractors are making good progress with the grading along the Houlton or southern end of the road, and about 15 miles of the grading is now finished. A continuous section of six miles from Houlton has been completed, and on the next three mile section, J. McLaughlin, who has the contract, has a large force at work on a 32 ft. fill near Smyrna. Some heavy masonry work is also to be done near the same place.

Binghamton & State Line.—Three preliminary surveys have now been made for this line from Binghamton, N. Y., south to the state line, but the location has not yet been decided upon. The line rises about 600 ft. to get out of the Susquehanna Valley, then follows undulating grades through the hills to the southern terminus. It will be between 11 and 15 miles long from Ross Park in Binghamton to Vestal, in Boone County, N. Y. The majority of the stock is owned by Erastus Ross, President of the Merchants' Bank of Binghamton, and the contract has been let to him in general terms to build the road.

British Mexican.—Grading on this line near Jimenez, Mex., was begun about two months ago by David Shaw & Co., of the City of Mexico, and they have so far completed about 20 miles of grading. The firm has the contract for the entire construction of the road, including all material and rolling stock. No sub-contracts have been let, and at present less than 100 teams are working. The road is to be built from Jimenez to Lake Jaco, Mex., a salt lake, and thence to Sierra Mojada, an important mining district, a distance altogether of about 180 miles. About two-thirds of the line has been located. There is very little rock work and the maximum grade is 79 ft. to the mile, and the maximum curvature 12 deg. The company was organized in Scotland, the projectors being wealthy Scotchmen who own the salt lake, and it is said that they propose to organize a colony of Scotch crofters to settle the country between Jaco and Sierra Mojada. The Chief Engineer in Mexico is John E. Earley, whose address is Jimenez, Chihuahua, Mex.

Brooklyn Elevated.—The contracts were awarded Oct. 15 for extensions of the elevated road in Brooklyn, N. Y. About one and one-half miles of structure is to be built in the Twenty-sixth ward from the terminus on Fulton street at Schenck avenue, thence through Fulton street to Crescent avenue and through Crescent avenue to Jamaica avenue to the entrance of Cypress Hill Cemetery, aggregating in all about 4,000 tons of iron work. This work was awarded to the Edgemore Bridge Works, who are to commence the erection early in December and complete the same March 1. The contract in South Brooklyn was awarded to Cofrode & Saylor for about 6,000 tons of iron to be erected from the present terminus of the Brooklyn Elevated road at Fifth avenue and Thirty-eighth street, through Thirty-eighth street to Third avenue, and thence along Third avenue to Sixty-seventh street, with a branch at or near Third avenue and Thirty-ninth street to Thirty-ninth Street Ferry. This work is to be completed June 1, 1893. Both of these structures will be really extensions of the Brooklyn Elevated, with which agreements have already been made for operating the lines as soon as completed. The structure will be in most respects entirely similar to the more recent structures of the Brooklyn Elevated road.

Charleston, Clendennin & Sutton.—The track on this line has been completed as far as Jarrett's Ford, Kanawha County, W. Va. The track is in use for about nine miles from Charleston, W. Va., and some freight has been handled.

Charleston, Sumter & Northern.—The line from Bennettsville to Gibson's Station, S. C., a distance of 11 miles, has been completed and is now in operation, the mileage being added to the main line.

Findlay Belt.—A passenger train was run over the four miles of completed road on Oct. 7, being the first passenger train over the entire line from the connection with the Cleveland, Cincinnati, Chicago & St. Louis and over the Blanchard River Bridge, to the Hydraulic Press Brick Works. The road now completed passes through the principal manufacturing district of the city and reaches the Weatherall and Briggs Rolling Mills, Salem Wire Nail Works and other important factories, and it makes connections with five railroads.

Great Northern.—Only a little over 100 miles of track remains to be laid to complete the Pacific extension. Grading, with the exception of something less than 30 miles, is finished, and this will be done before the track-layers reach it. President Hill says the connection between the two divisions will be made about Nov. 15.

Houston Belt.—Thomas Nichols, of Galveston, Tex., General Manager of this road, states that he has now secured all the right of way for about 10 miles, with the exception of two or three pieces of property. R. H. Harrison, of Houston is President of this road.

Hannibal Short Line.—Meetings are being held along the line of this proposed road, recently organized to build from Perry, Mo., southwest to Rochefort on the new St. Louis extension of the Missouri, Kansas & Texas, which is being built along the north bank of the Missouri River. The route is through Sturgeon and Harrisburgh to Rochefort, and committees have been appointed in these towns to secure right of way and other aid for the new line.

Huntington & Big Sandy.—The company is now pushing its construction work between Ceredo and Kenova, W. Va., with all possible haste, and it is expected to have the track completed before Nov. 1, when connections will be made with the Norfolk & Western at Kenova.

Jacksonville, St. Augustine & Halifax Valley.—Louis McLain, of Savannah, has the contract for the track-laying on the extension to Rockledge, Fla., about 75 miles, and has the rails laid for about 25 miles south of Daytona through Port Orange and New Smyrna to a point near Oak Hill. Trains will begin running to New Smyrna this week, and the entire line to Rockledge will be in operation by Jan. 1. The grading has been practically completed except through about five miles of swamp, where the work is being delayed by rain. The contractors are L. G. Campbell, Hines & Williams, McLain & Brown, McLain & Olevi and F. W. Samms.

Kanawha & Michigan.—The Kanawha Valley extension from Malden, W. Va., to the Gauley River, is progressing rapidly and within a month the grading will have been completed and ready for the track-laying. This extension is to connect with the Chesapeake & Ohio's Gauley River branch, which is also well under way and will be completed at about the same time as the other branch. The bridges at Narrow Falls on New River and over the Gauley at Twenty Mile are also well under way and will probably be ready when the other work is completed. It is stated that a new branch up Twenty Mile will be built this winter by both companies. It is a fact that the surveying corps is running lines up that stream and there is coal and timber territory up Twenty Mile creek that needs an outlet.

Kishacoquillas Valley.—E. A. Tennis, of Thompsonstown, Pa., has been awarded the contract to build

this road, including all stations, etc. The line will be ten miles long, and extend from Reedsdale on the line of the Mifflin & Centre County road to Belleville, Pa.

Little Falls & Dolgeville.—This road was completed on Oct. 15, when the track was laid within the corporate limits of the village of Dolgeville, N. Y. The road is about 11 miles long from Little Falls, N. Y., on the New York Central road; north to Dolgeville. The track laying has been delayed by the heavy rock work that has been necessary, and lately by the erection of the high bridge over Ransom Creek.

Mohawk & St. Lawrence.—The track-laying on this road, which is more familiarly known as the Adirondack & St. Lawrence, was completed Oct. 12, the rails joining the southern and northern divisions being laid on that day by President W. S. Webb at a point near Twitchell Creek, near Big Moose Lake and 100 miles south of Malone, N. Y. The first regular through train is scheduled for Oct. 24, the distance from Herkimer to Montreal being 249 miles. The trains will run over the Grand Trunk for the last 43 miles from Valley Field to Montreal. It is stated that two daily trains will be run during the winter from New York to Montreal. Most of the bridges for the 40 miles north of Fulton Range are reported to be temporary wooden structures and will be replaced as soon as possible with iron bridges.

Monongahela River.—This road is one of the lines of the West Virginia & Pittsburgh, which is controlled by the Baltimore & Ohio, and it furnishes a large amount of freight to the latter company from the coal mines along its line. At this time the road is making extensive improvements at Fairmont, W. Va., which will be used in conjunction with the Baltimore & Ohio and the Fairmont, Morgantown & Pittsburgh roads. At Coal Run, a few miles out from Fairmont, the old wooden bridge has been removed and in its stead a heavy stone culvert has been erected wide enough for four tracks, two for the Baltimore & Ohio and two for the Monongahela River. One track is reserved for through trains for the east, another for local trains, another for the coal train and the fourth, the "Short Route" through the upper Marion region. The Fairmont Belt Line, which was mentioned a few weeks ago, will connect with the main line of the Monongahela River road with a grade of 103 ft. to the mile will connect with all the shippers in the Fairmont District direct. New tarbables and terminal facilities are also being provided at Fairmont and the Fairmont, Morgantown & Pittsburgh Co. will also use them. The Monongahela River road is also grading for an extension to Gaston Junction, where it will reach coal mines. All sidings at the various mines along the upper end of the road will be increased in length, $\frac{3}{4}$ miles of new siding going down at Gaston along.

Newport & Sherman's Valley.—It is estimated that the extension of this road from Blain, Penn. County, to Dry River, Franklin County, will cost nearly \$280,000. It will be a narrow gauge line about 15 miles long.

New Roads.—The Taylor Coal & Mining Co., which has mines at Dickson, and McCuneville, O., proposes to build about two miles of road to give a better connection with the Baltimore & Ohio road. The location of the new line has not yet been decided.

New York, Susquehanna & Western.—The second track work has been completed as far as North Paterson, 24.6 miles from Jersey City, and trains began running over the new double track last week, the terminal having been changed from Riverside.

Norfolk & Western.—Regular trains will be put on the Ohio River Extension about Nov. 1. The road will then have through train service from Norfolk, Va., to Columbus, O., something over 700 miles. Some freight traffic has already been handled.

Northern Central.—Five miles of new second track on the Susquehanna division was placed in operation last week. The new track is from Mebantango to Georgetown, near Sunbury, Pa., and the work included the building of an iron bridge over the Mebantango Creek.

Ohio Southern.—As already reported, the engineers have completed the survey for the proposed extension north to Lima, O., a distance of about 60 miles. The new line runs nearly north from Springfield, O., and passes through Tremont City, Westville, Degraff, Loganville, Bloom Center, Santa Fé, New Hampshire and South Warsaw. The only railroads crossed are the Pittsburgh, Cincinnati, Chicago & St. Louis at Westville, and the Cleveland, Cincinnati, Chicago & St. Louis at Degraff.

Oxford & Coast Line.—The grading is now completed on the $\frac{4}{5}$ miles of this road starting from Oxford, N. C., and connecting with the Durham & Northern 10 $\frac{1}{2}$ miles south of Henderon. The trestles have been framed at the mills, and will be put in as the track reaches each trestle. The road when completed will be operated by the Seaboard Air Line. The town of Oxford voted \$20,000 to aid in building this road, but it is not likely that the subsidy will be collected without considerable litigation. A. W. Graham is President and A. A. Chapman, of Oxford, N. C., Chief Engineer.

Pennsylvania.—The tracks through Huntington, Pa., were removed within 25 minutes on Sunday, Oct. 9, by a force of 300 men, from the north to the south side of the Huntington station. The change was made to eliminate curves and to get rid of several grade crossings.

Peoria Terminal.—The principal work at present under way on this belt line at Peoria, Ill., is the erection of bridges. The road when completed will be about eight miles long, and it is expected to have it in operation by Jan. 1 next. C. E. Wickham is the Chief Engineer.

Philadelphia Belt Line.—Armstrong & Printzenhoff, of 136 South Fourth street, Philadelphia, are the contractors for the trestle work now being built in the Delaware River on the northern division of the road at Bridesburg. Charles S. Campbell, of 227 South Fourth street, Philadelphia, is the contractor for building the section of road now under construction. The line is now completed for $\frac{3}{4}$ miles.

Port Arthur, Duluth & Western.—The main line of this road from Port Arthur, Ont., is now practically completed to the international boundary line at Gunflint lake, Minn. The road is being operated for a distance of 80 miles southwest of Port Arthur, and the track is now being laid on the last five miles, so that trains will probably be running to the Minnesota State line by Nov. 1. A branch is being built from the International boundary, a distance of about six miles, into Minnesota to the mines of the Gunflint Iron Co., and the line will probably be completed by Nov. 15. The maximum grade on the main line is 66 ft. to the mile, and on the branch 158 ft., the maximum curves being eight degrees and 30 degrees respectively.

St. Louis, Chicago & St. Paul.—The engineers are now engaged on what will probably be the final survey for the St. Louis extension of this road. Two surveys for the new line have already been made. The officers of the company have practically completed an arrangement with the Levee Commissioners of Madison County for building a new levee from Alton to East St. Louis, about 20 miles. A large part of the present system will be utilized, but the levees will be raised and strengthened, and the railroad tracks laid on top of the new embankment for the entire distance.

Shelton & Southwestern.—The construction of the extension from Shelton, Wash., is still going on, but at present only 50 men are being employed, and the work will be continued with this force until the rainy season compels the suspension of all work. The company is a reorganization of the Mason County Central, and the line is being extended in a south westerly direction from Shelton, Wash., to a point on Gray's Harbor not yet determined. So far about 12 miles of the line has been completed. A. C. Mason is President and E. E. Crowell is Secretary.

Trinidad, San Luis Valley & Pacific.—We have recently noted that the survey for this road, previously called the Trinidad & San Luis, had been completed from Trinidad, Col., to the summit of Costillo Pass, which is at an elevation of 10,128 ft. C. H. Knickerbacher, who is in charge of the surveys, which are being made for J. R. De Kemer, a contractor of Denver, Colo., has commenced the survey from Costillo Pass to the San Luis Valley. The length of the line from Trinidad to Costillo Pass is 60 miles, 47 miles being in Colorado and 13 miles in Mexico. The survey is via Stonewall and along Las Animas River, the south fork of the same river, and via San Francisco Pass to Vermego Creek and thence to Costillo Pass. There will be about eight miles of heavy work on this section, including four tunnels each about 175 ft. long and two iron bridges about 190 ft. long. The maximum grade is 105 ft. to the mile and the maximum curves are 12 deg. The organization of the company is not completed and no definite arrangements have been made for building the road.

Unadilla Valley.—The grading has recently been resumed near Leonardsville, N. Y., as already reported, and it is expected to have about five miles of the road in operation this year. The grading on 10 miles is almost completed, most of the work having been done last year. One mile of track has been laid, and four miles more will soon be laid. George M. Rusling, of 137 Broadway, New York, who has the contract has about 100 men employed at present. The road is to be built from Bridgewater on the Richfield Springs branch of the Delaware, Lackawanna & Western through Leonardsville, West Edmeston, Columbus and South Edmeston to New Berlin, N. Y., a distance of 20 miles. The grading is easy work, and a few short trestles will be the only bridge work. The grades are 47 ft. to the mile and the sharpest curve six degrees. The New York office is at 80 Broadway.

Utah & Wyoming.—Theodore Brough, of Salt Lake City, Secretary of the company, writes that 86 miles of the line has now been located west of Salt Lake City through Perry and Emigration Canyons, and it is proposed to construct and equip the first 17 miles west of Salt Lake City at once so that arrangements can be made to transport coal to Salt Lake City this winter. The contract for building and equipping this section will be let immediately and contractors are asked to address the Secretary.

Wabash.—A recent report from one of the officers states that between 65 and 75 miles of track has been laid on the Detroit & Chicago extension up to the present time. All the contracts for the work have been awarded, and the greater part of the grading has been completed. The extension will be 153 miles long from Montpelier, O., west to Hammond, Ind., near Chicago. The road has been incorporated as the Montpelier & Chicago, but the line will be known as the Wabash Railroad Detroit & Chicago Extension. The bonds issued to provide funds for building the line, which amount to \$3,500,000, have all been sold. They bear five per cent. interest and become due in 1941. It is proposed to spend \$700,000 in rolling stock for the new line, all of which will be purchased out of the sale of the bonds.

West Virginia & Pittsburgh.—The Gauley extension is completed as far as Camden-on-the-Gauley, which will be the present terminus, about 30 miles south of Flatwoods, W. Va., on the main line. The new road has been turned over to the company, and two daily trains were put on last Monday.

Wilkesbarre & Eastern.—The completion of this road, which is being built between Wilkesbarre and Stroudsburg, Pa., 60 miles, will be much delayed by inferior stone work, which was built by the contractors and which the engineers have condemned. The contract has been transferred to Granger & Richardson, and they state that it will be necessary to rebuild most of the work.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The company reports gross earnings for September of \$2,600,000, an increase of \$275,000 as compared with the same month of last year, and net earnings of \$1,021,000, an increase of \$206,000. For the three months ending Sept. 30 the gross earnings were \$7,100,000, an increase of \$193,000 as compared with the corresponding period of last year, and net earnings \$2,375,000, a decrease of \$5,000.

Chicago, St. Paul & Kansas City.—The annual report for the fiscal year ending June 30, when the property was leased to the Chicago Great Western shows:

	1892.	1891.	Inc.
Gross earnings.....	\$5,024,740	\$4,360,871	\$663,869
Operating expenses....	3,664,677	3,285,240	379,337
Net earnings.....	\$1,360,063	\$1,075,511	\$284,552

During the year there have been in operation 922 miles, an increase of 4.01 per cent. over 1891. The cost of the road, including terminals and equipment, is \$47,046,459. With accounts receivable, funded interest, cash on hand and other items, this amount is increased to \$51,124,246, representing the total assets of the road. The expenditures for construction and betterments during the year were \$388,141.

International & Great Northern.—An order was granted in the district court at Tyler, Tex., on Oct. 15, finally dismissing T. M. Campbell as Receiver. The road has been practically operated by the new company since July, when Mr. Campbell was appointed General Manager.

Lackawanna, Lake Erie & Honesdale.—The Directors of the company met for organization in Scranton,

ton, Pa., Oct. 17. W. H. Dimmick, Honesdale, Pa., was elected President, Charles Dupont Breck, Treasurer, and T. J. Ham, Secretary. It was resolved to proceed at once with the construction of the road, which will extend from Honesdale, a point on the Delaware, Lackawanna & Western, midway between Elmhurst and Moscow, Pa., 24 miles.

New York, New Haven & Hartford.—The lease of the Housatonic and New Haven & Derby roads to this company was ratified by the stockholders on Oct. 18, nearly the entire stock vote of both roads being represented. The Housatonic stock vote of 23,898 resulted 21,091 in favor of leasing to 2,807 against. The New Haven & Derby road stockholders voted unanimously for leasing, the stock vote being 3,734.

Pennsylvania.—Preliminary work on the track elevation at Elizabeth, N. J., is being pushed forward. A second yard for framing the timber for the temporary trestle has been established at Chestnut and Magnolia streets and Pennsylvania avenue. The tracks of the Central of New Jersey at the crossing have been spread further apart to make room for the foundations of the piers of the overhead structure at that point. At the Chestnut street crossing excavations are being made for the abutments of the crossing bridge at that point. The excavation is being carried entirely under the four tracks, which are being temporarily supported on timber false work. Considerable opposition has been developed among property owners to the company's proposed plan of closing Cherry street and Rahway avenue at the present crossings and opening a new street between them. At the last meeting of the City Council it was decided to leave Rahway avenue on the same line as at present, close Cherry street and open the proposed new street in its place.

Pittsburg & Western.—At the meeting of the stockholders in Allegheny, Oct. 14, the proposition to increase the capital stock and the bonded indebtedness of the road to the extent of \$1,500,000 was unanimously approved. It is now proposed to double track the line, reduce the grade at various points and put the road in first class condition.

Pullman's Palace Car Company.—At the annual meeting of the Pullman Palace Car Co., held last week, the following directors were re-elected: George M. Pullman, Marshall Field, J. W. Doane, Norman Williams, and O. S. A. Sprague, of Chicago, Henry C. Hulbert, of New York, and Henry R. Reed, of Boston. The usual quarterly dividend of \$2 per share from net earnings was declared.

The annual statement for the fiscal year ending July 31, 1892, is as follows:

	Revenue.
From earnings of cars.....	\$8,061,031
From patents.....	21,751
From manufacturing, rentals, dividends, interest, etc.....	1,919,523
	\$10,002,305
	Disbursements.
Operating expenses.....	\$3,438,862
Net earnings paid other interests in sleeping car associations controlled and operated.....	947,504
Interest on debenture bonds.....	65,600
Dividends on capital stock.....	2,300,000
	\$6,751,966
Surplus.....	\$3,250,339

New contracts have been made with the following companies: Little Rock & Memphis, for a period of 25 years from May 2, 1892; Western New York & Pennsylvania, for a period of 25 years from May 2, 1892; Chesapeake & Ohio, extended for a period of 15 years from Jan. 1, 1892.

There have been built in the year 80 sleeping and dining cars, costing \$1,332,880, or an average of \$16,661 per car. Work is now progressing on 415 additional sleeping, dining and parlor cars. These are estimated to cost about \$5,500,000.

The cars owned and controlled are 2,239, of which 1,985 are standard and 254 tourist or second-class cars. The number of passengers carried in the year was 5,279,020, and the number of miles run was 191,255,656. Last year the number of passengers carried was 5,310,813, and the number of miles run was 186,829,836. The total mileage of railroads covered by contracts for the operation of cars of this company is 125,111 miles.

The average number of names on the payrolls at Pullman for the year was 4,942, and wages paid \$2,918,997.41, making an average for each person of \$590.65, against \$610.73 for the previous year. The total number of persons in the employ of the company in its manufacturing and operating department is 12,800, and wages paid during the year \$6,619,156.63.

St. Louis, Collinsville & Carondelet Belt.—A mortgage for \$1,500,000 in favor of the New York Security & Trust Co. was filed last week in St. Clair and Madison counties, Ill. The company proposes to build a double track road from the eastern terminus of the St. Louis and Merchants' Bridge terminal line to East Carondelet, Ill.

St. Paul & Duluth.—The earnings for the fiscal year ending June 30, 1892, are given in the following comparative table:

	1892.	1891.	Inc. or Dec.
Gross earnings.....	\$1,934,510	\$1,621,939	I. \$312,571
Operating expenses.....	1,234,617	1,021,581	I. 213,036
Net earnings.....	\$699,893	600,358	I. \$99,535

The net earnings have been sufficient to meet the payment of all fixed charges and other items charged to the income account and seven per cent. dividend upon the outstanding preferred stock. There is on hand to the credit of the redemption fund for the preferred stock \$226,626. The funded debt of the road is as follows: \$3,500,000 five per cent. mortgage bonds; \$210,000 six per cent., and \$248,000 seven per cent. bonds. There is outstanding: Preferred stock and scrip, \$5,188,810, and common stock and scrip, \$4,000,207; total stock and scrip, \$9,189,017.

During the year the grades of the main line have been reduced at several points; a branch five miles in length has been built from Miller Station to the quarries of the Water Power Sandstone Co.; the Union Depot and the Sixth Avenue Viaduct, at Duluth, have been completed, and many other important improvements are under way. The most important work to be accomplished during the year is the completion of the reduction of grades between Hinckley and Carlton to a maximum of 26 ft. per mile, and the development or acquirement of proper and independent terminals at Minneapolis.

The company will expend \$150,000 in terminal improvements at Duluth, which will include 10 miles of terminal tracks.

Santa Fe, Prescott & Phoenix.—A mortgage for \$1,550,000 in favor of the Mercantile Trust Co., of New

York, was filed at Phoenix, Ariz., last week. The bonds were issued at the rate of \$25,000 per mile on the 60 miles from Ash Fork to Prescott, Ariz., and bearing five per cent. interest. It is stated that the bonds are guaranteed by the Atchison, Topeka & Santa Fe.

TRAFFIC.

Traffic Notes.

The railroads entering Atlanta, Ga., have decided to abolish the system of free delivery of freight in vogue there for several years.

The Cincinnati, Hamilton & Dayton has given notice of a reduction of round trip tickets between Cincinnati and Chicago from \$8 to \$6.

The Southwestern Railway & Steamship Association will, on Oct. 29, put into effect new interstate cotton rates, averaging an increase of 10 per cent.

The Northern Steamship Co. announces the restoration of rates from New York and other Eastern points to St. Paul to a basis of \$1.01 to St. Paul and 90 cents to Duluth.

The Chicago-St. Paul roads have agreed to advance the rates on soft coal to the basis of \$2 per ton from Chicago to St. Paul and Minneapolis. The present basis is \$1.75 per ton.

The Boston & Albany has notified the Massachusetts Railroad Commissioners that the company will not comply with the law passed by the last legislature requiring the railroads to issue and accept for passage interchangeable mileage tickets. The Commissioners will bring suit against the company to test the constitutionality of the law.

The Utah and Montana Joint Rate Sheet, the members of which are the Southern Pacific, the Northern Pacific, the Great Northern, Rio Grande Western and Union Pacific, has been disrupted by the Union Pacific giving notice that its connection with that sheet terminates with the present issue. The Union Pacific proposes that two rate sheets be issued for the Utah and Montana territory.

The Chicago & Northwestern and the Chicago, St. Paul, Minneapolis & Omaha has established daily through train service between Chicago and Duluth. Heretofore the passengers have been compelled to change at Eau Claire. The train leaves Chicago at 5:50 p. m., reaching Duluth at 8:50 the following morning. The eastbound train leaves Duluth at 4:50 p. m. and arrives in Chicago at 7:45 a. m.

Chairman Caldwell, of the Western Passenger Association, has notified all connecting lines, as well as members of the association, that the so-called special reduced rates now in effect between Chicago, St. Louis and Missouri River cities will be discontinued Oct. 31, and the following rates will be in effect in both directions: From Chicago to Kansas City, Atchison, Leavenworth and St. Joseph, \$12.50; to St. Louis, \$7.50; from St. Louis to Kansas City, \$7.50; Leavenworth, \$8; Atchison and St. Joseph, \$8.50. A corresponding advance will be made on all intermediate rates affected, and tickets between points named limited to one day from date of sale. The Chicago & Alton has signed the notification. This terminates the war which began when the Alton left the association two years ago.

Chicago Traffic Matters.

CHICAGO, Oct. 19, 1892.

The Chicago-St. Paul lines are claiming that the Nickel Plate has stocked the St. Paul market with return portions of round trip tickets, which are good from Chicago to New York in connection with the Lackawanna from Buffalo, and are to be used to supplement return portions of harvest excursion tickets from St. Paul to Chicago, and thereby effect a cut of \$6.50 in the rate from that point to New York. Chairman Caldwell is investigating the matter.

Western freight association lines have agreed to an advance of 25 cents per net ton on soft coal from Chicago and Milwaukee and Chicago group points to St. Paul and Minneapolis; also from Iowa mines to the same points; rates from Milwaukee to points in Iowa, Minnesota, North and South Dakota and La Crosse in no case to be less than the rates from Chicago to same territory; effective Nov. 1.

The Great Northern attempted, by voting in the negative, to defeat the proposition submitted in the Trans-Missouri Association to make a one way fare from points over 350 miles from Chicago for the dedicatory exercises, but the roads interested in the traffic in question decided to make the rate notwithstanding the adverse vote of that company.

Commencing Oct. 16, the Chicago & North Western inaugurated a new through train service between Chicago and Duluth in both directions, making a considerable reduction in the present running time.

The joint committee for the Central Traffic and Trunk Lines associations have issued new rules governing milling-in-transit privileges at Mississippi River crossings, East Burlington to East Louisiana, inclusive, applying the 116¢ basis at the Chicago-New York rates from these points on wheat, corn, oats and barley and their products; grain to be in full carloads of 24,000 lbs., or upward, consigned to millers only, and the product delivered, carload for carload, within 30 days after receipt of the grain at mill.

The roads in the Western Passenger Association were compelled by the position taken by the Milwaukee & St. Paul to make a rate of one cent per mile for the regular troops for the dedicatory exercises; the counsel of that road taking the position that inasmuch as this rate had been made for the State militia, it would be unlawful to make a higher rate for the Government troops.

The Commissioners of the Western Traffic Association have yet several items of unfinished business which they evidently propose to clean up notwithstanding the fact that their decisions will be binding for only a few days. They meet again the 25th inst. to consider the matter of rates in the Northwest, and have now under consideration the matter of a reduction in eastbound trans-continental passenger rates on the application of the Santa Fe to make a reduction of \$4 in first-class and \$5 in second class rates, on the ground that tariff rates are being manipulated to that extent at least, and the reduction is necessary to equalize secret and open cuts being made by means of commission, etc.

The Rock Island has joined the other lines in abolishing stop-over privileges, effective Nov. 1.

In view of the statement that has been repeatedly made that the Western Freight and Western Passenger associations are entirely sufficient to cover all the territory with the present agreements, it seems little strange that so many traffic officials should consider it necessary to propose new agreements designed to either bolster up the existing associations, or form a new asso-

ciation to take the place of the defunct Western Traffic. It will be found, however, if an attempt is made to form a new association covering trans-continental traffic that it will be impossible to get the necessary support at present. The Union Pacific, Northern Pacific, Canadian Pacific, Great Northern, Atchison, Burlington & Missouri River and Rock Island have all withdrawn from the Trans-Continental association and several of the strong lines have indicated that they do not propose to go into any new agreement so long as there is likely to be trouble over the position taken by the Great Northern in regard to trans-continental business and the attitude of the Canadian Pacific in regard to the import rates of the Southern Pacific.

The Union Pacific was finally successful in its effort to have passenger rates to Puget Sound territory via its line inserted in the Chicago rate sheet, notwithstanding the adverse decision of the courts and the protest of the Northern Pacific against the Union Pacific being permitted to quote through rates to this territory. The Chicago Railroad Association, by a majority vote, at first decided against the Union Pacific. The Northwestern and Alton supported the proposition, and the former took the matter into the Western Passenger Association, claiming that it was a matter affecting all the lines in the Association, and the action of the Chicago Railroad Association should not supersede the jurisdiction of the Western Passenger Association. Chairman Caldwell ruled that the point was well taken; in deference to his opinion the Railroad Association reconsidered its vote, and authorized the publication of the rates in the rate sheets. The Northern Pacific will continue to refuse to honor through tickets of the Union Pacific issue, thus compelling the latter company to provide its patrons with local tickets from Portland to destination.

Traffic officers who earnestly desire to do business on a sound and legitimate basis continue to give utterance to strong expressions of disgust at the *nolle prosequi* entered by the State's Attorney in the recent case against the scalpers. It is very discouraging, and those roads which are honestly endeavoring to secure the suppression of the scalping fraternity are out of all patience with the prosecuting officials who are responsible for the failure of the case. These roads are now endeavoring to protect themselves against the scalpers by refusing to issue any round-trip tickets for the World's Columbian Exposition. It seems unlikely that such an arrangement will receive the assent of all the lines, which assent will be necessary in order to render it effective, but there is no doubt that strong efforts will be made for the adoption of the plan proposed, a continuous passage one way ticket.

The Illinois law upon the subject of scalping is clear enough, requiring authorized ticket sellers to exhibit a certificate from the railroad company and imposing a penalty of \$500 and a year's imprisonment for violation, but there is a proviso permitting a bona fide traveler to sell his ticket to another so that it will always be hard to prove cases and probably impossible to suppress the brokerage business. The reports telegraphed from here that the law has been declared unconstitutional were, however, without foundation. The prosecution entered the *nolle prosequi*, and consequently no decision was rendered. The sudden determination of the district attorney to drop the case was ostensibly for the reason that the judge was *suspected* of leaning toward an opinion that this law was unconstitutional. The prosecuting officer either "lost his head" or else, which is more likely, there is so much politics mixed up with the district attorney's office that it was not expedient for him to longer follow with a prosecution those polite persons who have a political pull. Well informed lawyers here are of opinion that the law is constitutional and can be enforced. However this may be, the case ought to have been carried through, and if the law had been declared unconstitutional then steps could have been taken for the enactment of a substitute which would stand the test. As it is, opportunity is given to the scalpers to claim that the law is unconstitutional and that the railroads do not dare to press the case.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Oct. 15 amounted to 74,524 tons, against 71,770 tons during the preceding week, an increase of 3,754 tons, and against 56,516 tons during the corresponding week of 1891, an increase of 21,008 tons. The proportions carried by each road were:

Roads.	W'k to Oct. 15.		W'k to Oct. 8.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	13,825	17.8	13,448	18.6
Wabash.....	5,284	6.8	4,990	7.
Lake Shore & Michigan South.....	12,391	16.	8,718	13.5
Pitts., Ft. Wayne & Chicago.....	8,402	10.9	8,925	12.2
Pitts., Cin., Chicago & St. Louis.....	10,601	13.8	9,175	12.8
Baltimore & Ohio.....	4,456	5.8	4,132	5.8
Chicago & Grand Trunk.....	5,904	7.2	4,785	6.7
New York, Chic. & St. Louis.....	6,614	8.5	8,226	11.5
Chicago & Erie.....	7,296	9.3	7,092	9.9
C., C. & St. Louis.....	3,021	3.9	3,569	5.
Total.....	77,524	100.0	71,700	100.0

Of the above shipments, 2,691 tons were flour, 37,389 tons grain and millstuff, 12,034 tons cured meats, 11,742 tons dressed beef, 1,191 tons butter, 2,303 tons hides and 7,640 tons lumber. The three Vanderbilt lines carried 42.3 per cent., the two Pennsylvania lines 24.7 per cent. The lake lines carried 110,179 tons, against 122,142 tons during the preceding week, a decrease of 11,963 tons.

A Decision Under the Inter-state Commerce Law.

The United States Court of Appeals has handed down a decision by Justice Brewer in two cases involving the application of the provisions of the Inter-state Commerce law. The action was brought under the Inter-state Commerce act, John Osborne, of Scranton, Pa., suing for the recovery of alleged overcharges on corn shipped to Chicago. In January, 1888, he shipped from St. Paul to Chicago, but finding the through rate to New York was cheaper, a month later he began shipping through, taking advantage of the cheaper rate, and saved for the difference in rates, judgment being given in his favor for \$225. That decision is reversed.

Elevator Charge.

The Pennsylvania, Baltimore & Ohio and Philadelphia & Reading have agreed to abolish the elevator and floating charges on grain shipments to Philadelphia & Baltimore. Hereafter the full tariffs on grain will be charged by the three companies. This will make a difference in favor of the railroad companies of from three to five cents per 100 lbs.

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Year.	No. per year.	Grand total
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

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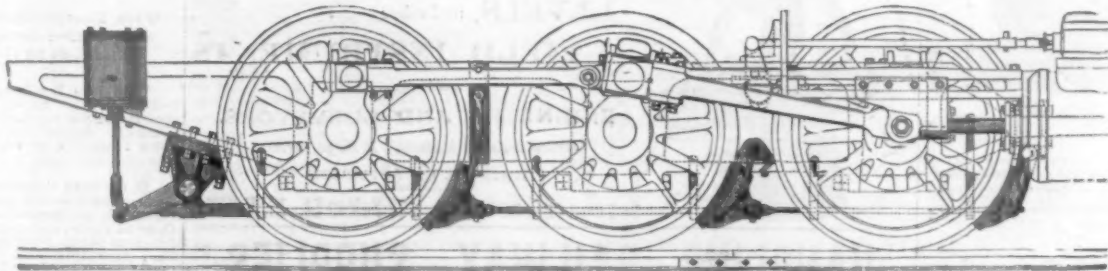
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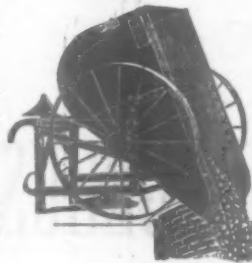
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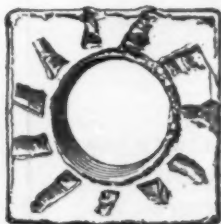
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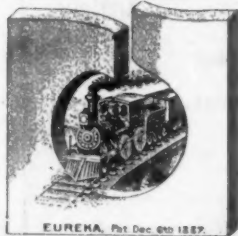
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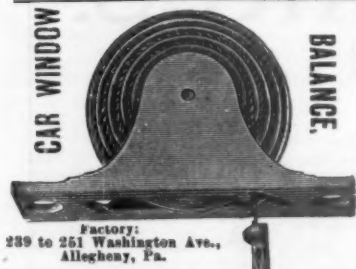
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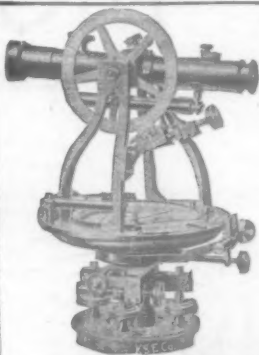
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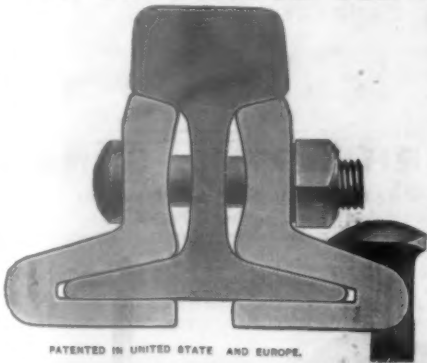
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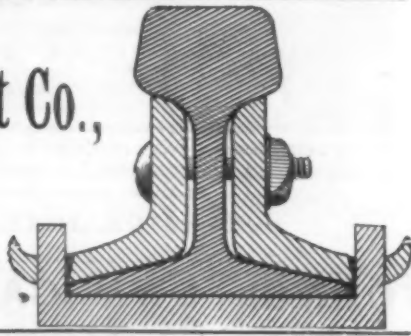
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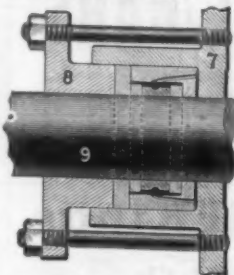
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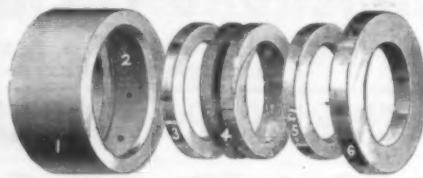


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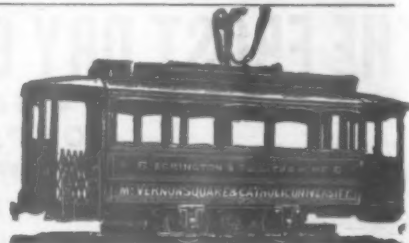
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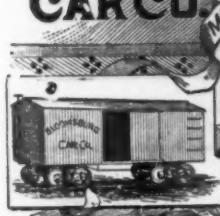
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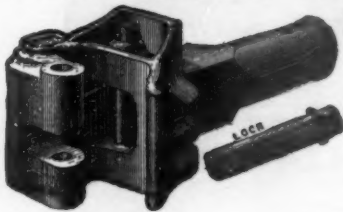
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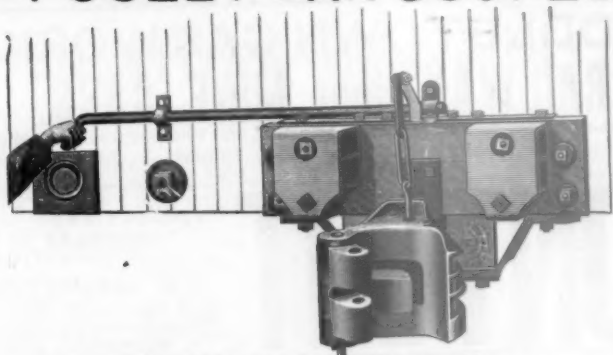
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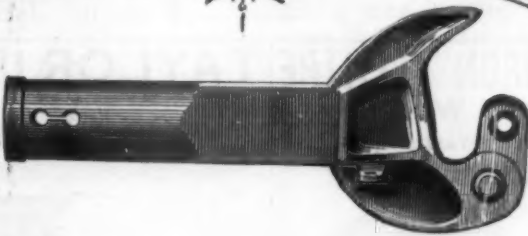
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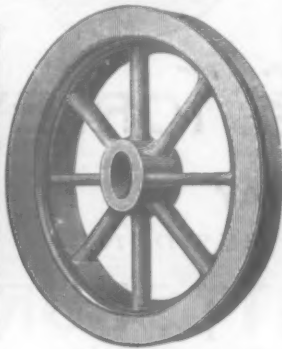
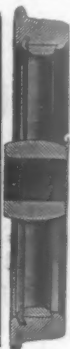
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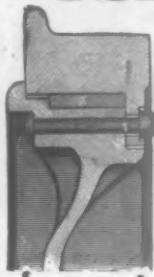
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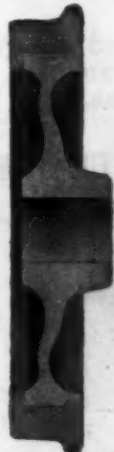
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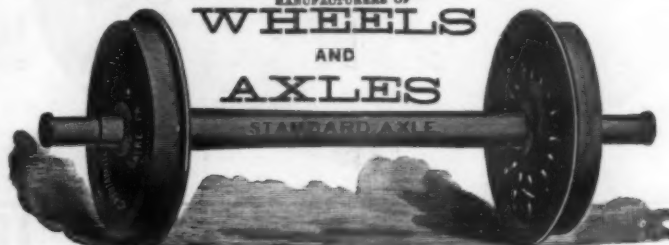
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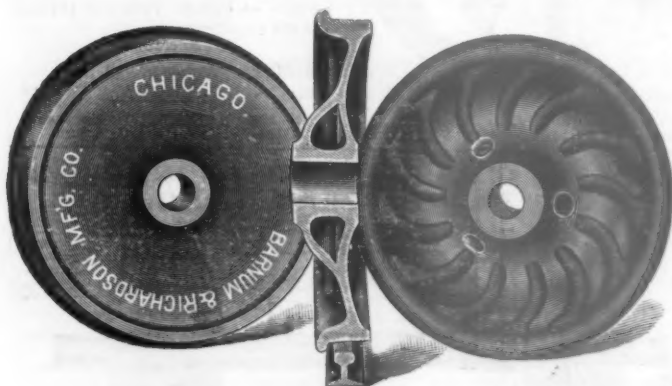
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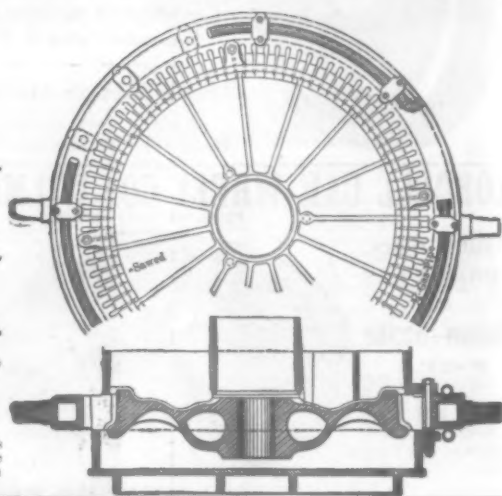
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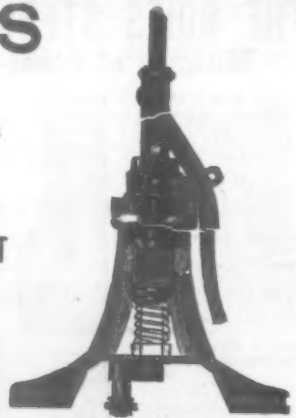
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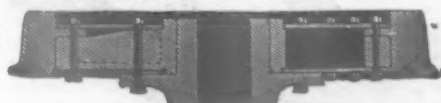
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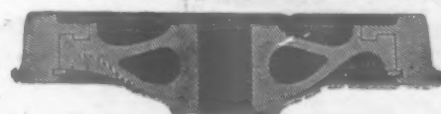
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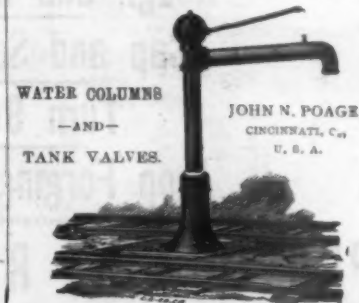
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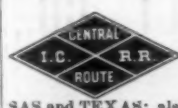
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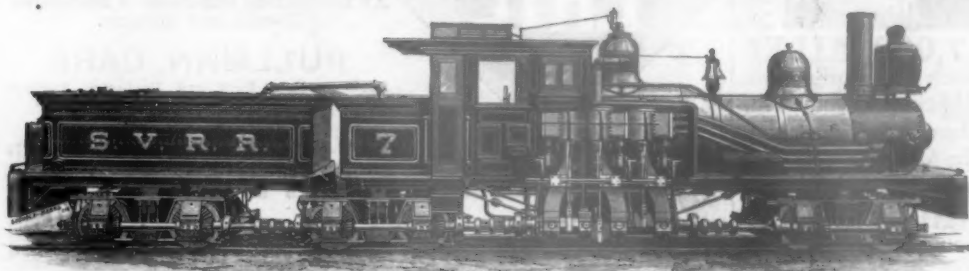


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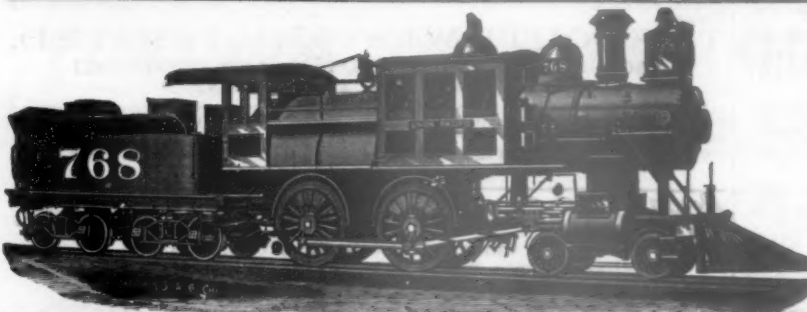


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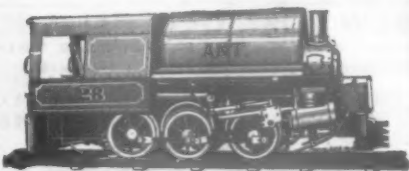
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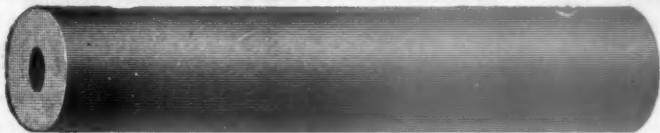
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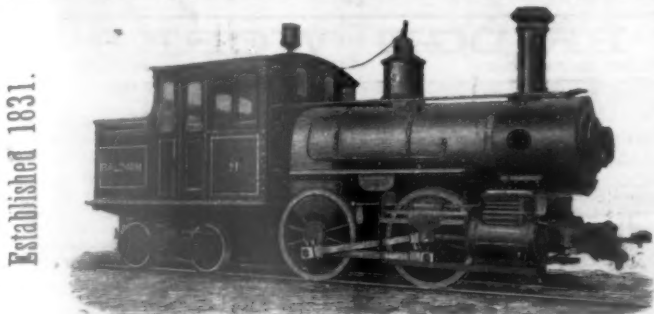
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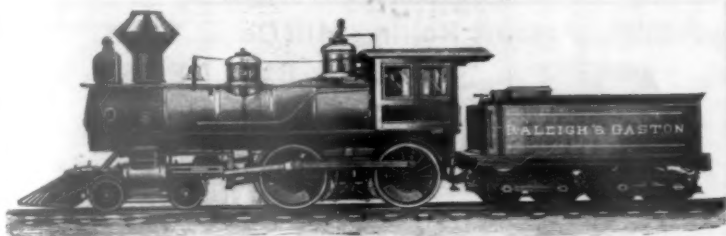
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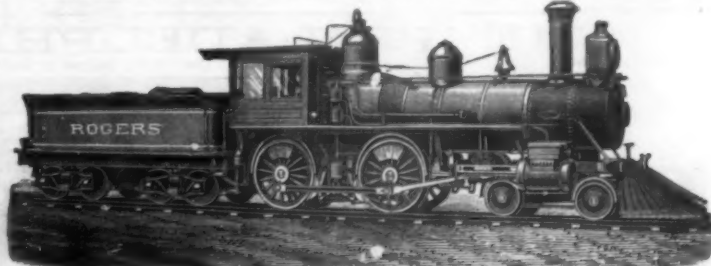
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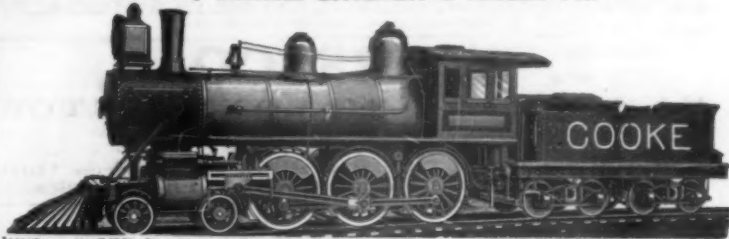
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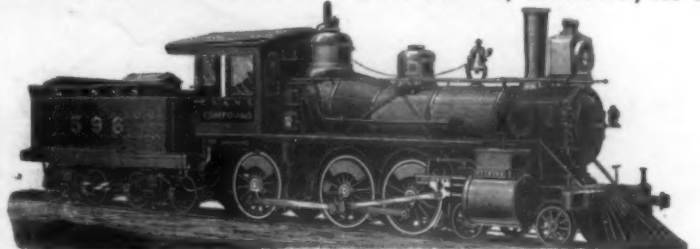
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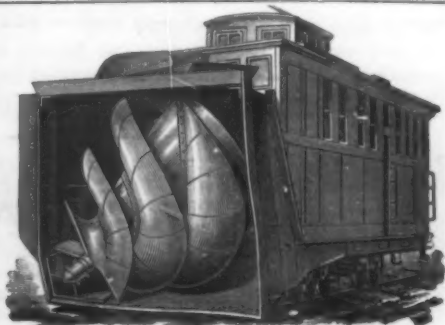
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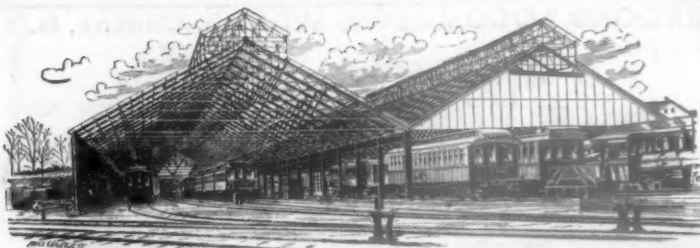
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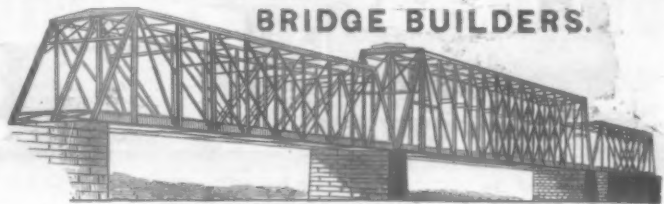
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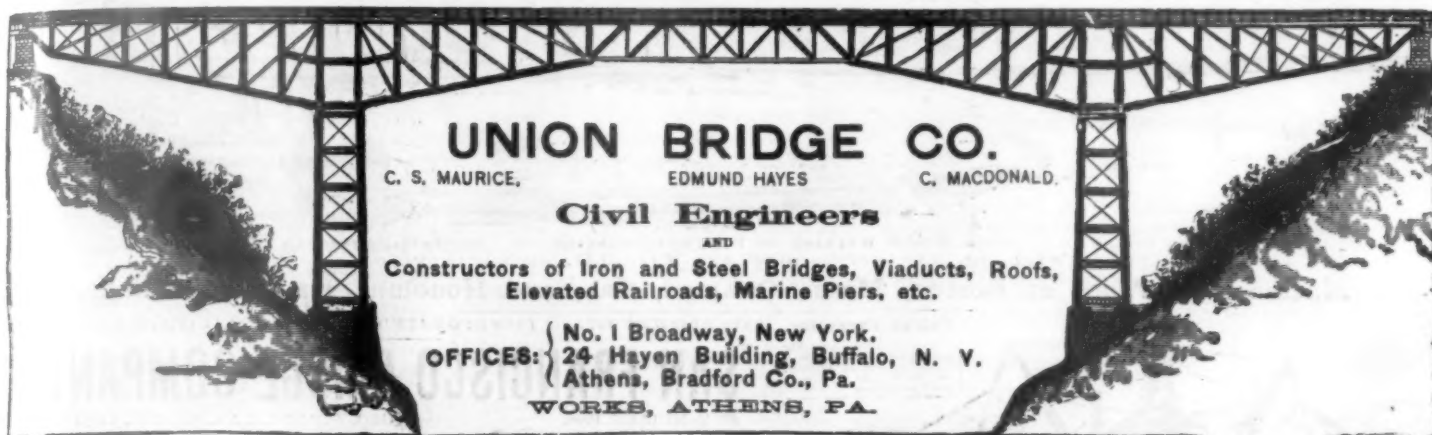
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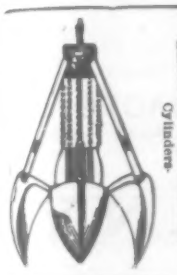


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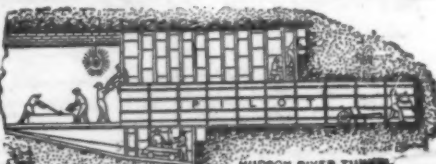
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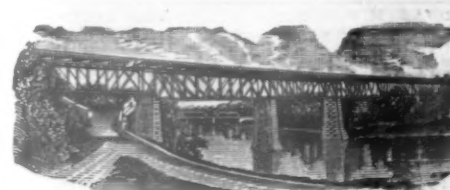


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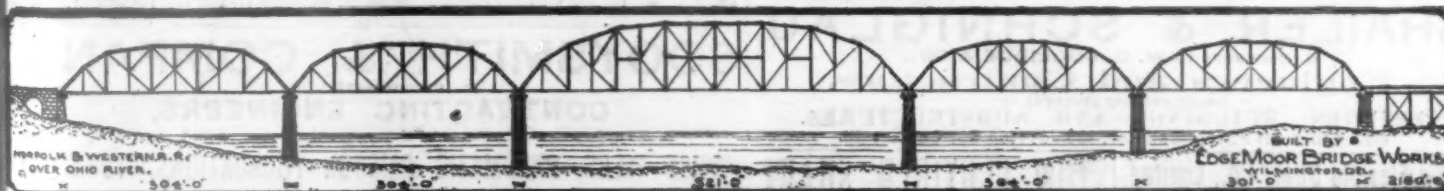


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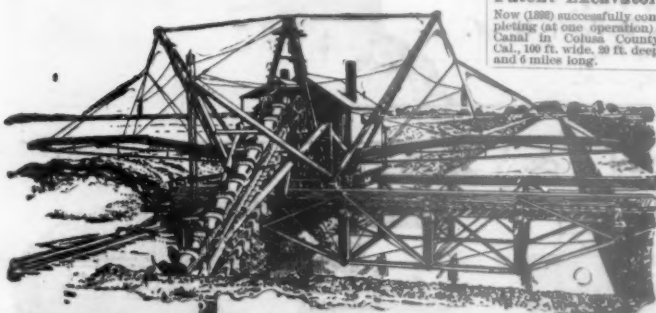
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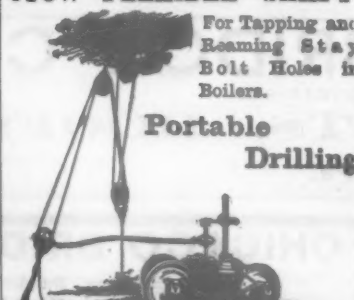
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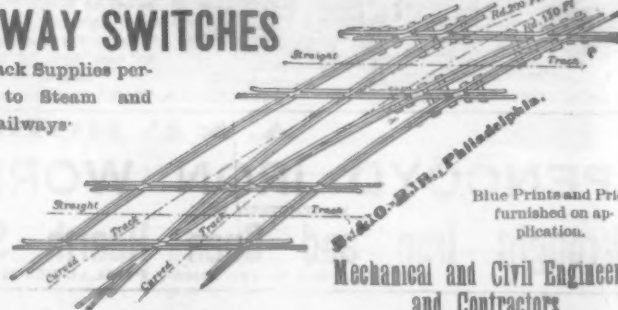
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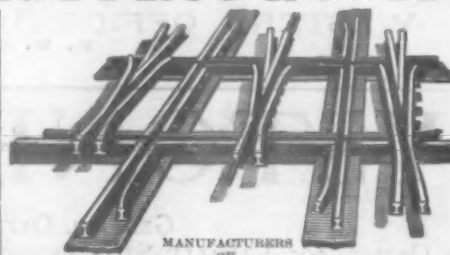
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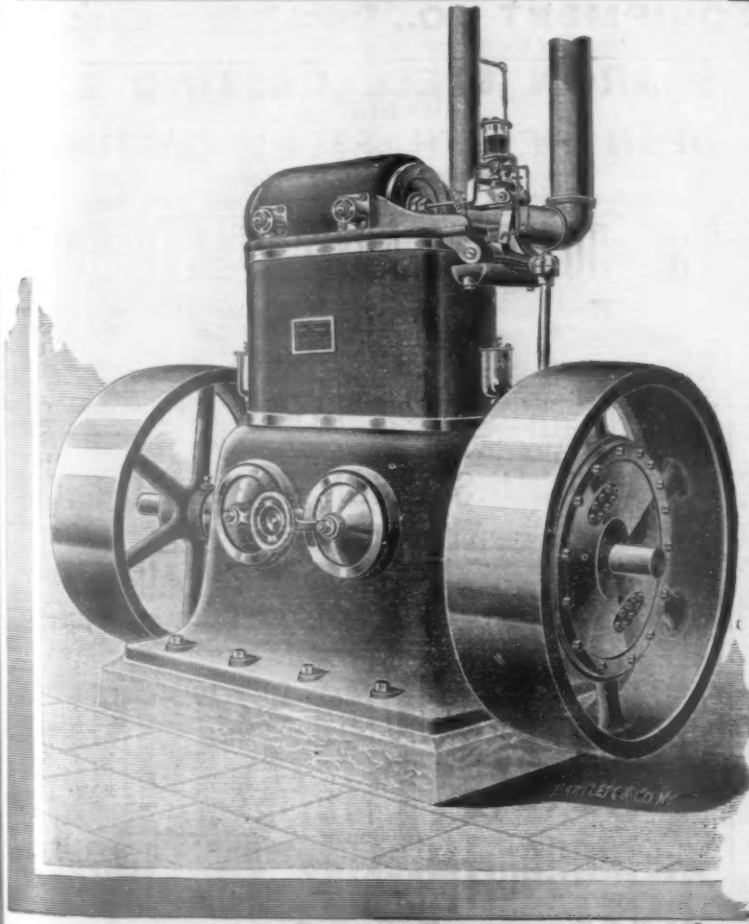
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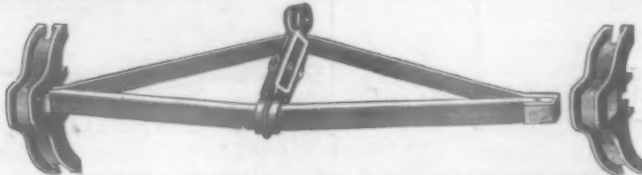
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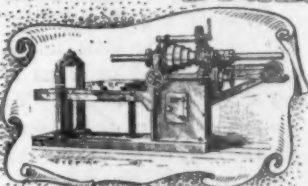
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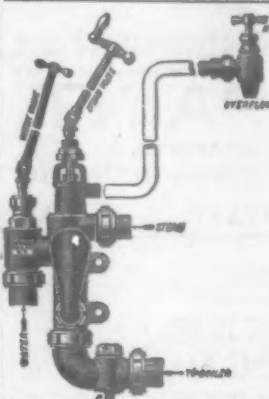


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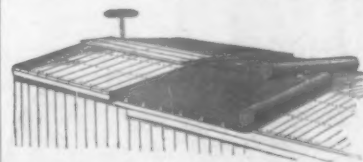
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